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O. P. BRYSCH, Editor

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1. MANAGEMENT

Russian Gas Industry

Gas Transmission Pipelines in USSR. Y. I. Bokserman. *Gasovaya Prom. 11*, 15-8 (1957). (Russian text.)

Total length of gas transmission lines in USSR today is 6200 miles; construction of 10,000 additional miles is scheduled during sixth five-year plan. This will include paralleling the present Stavropol-Moscow line and bringing natural gas to Leningrad, Sverdlovsk, Minsk, Vilnyus, Riga, Tashkent and other cities. Present Stavropol-Moscow line, completed in 1956, extends 810 miles, approximately 29-in. diameter, and is largest in Europe. General practice includes pumping pressures of 800 psig, use of aerial photography to select line location, use of thin-wall pipe of 33-in. diameter with plans to use 36 to 40-in. pipe and contact electric welding for pipeline construction in the field. J. W. Penney

Russian Gas Industry Up to 40th Year of Revolution. A. K. Kortunov. *Gasovaya Prom. 11*, 1-3 (1957). (Russian text.)

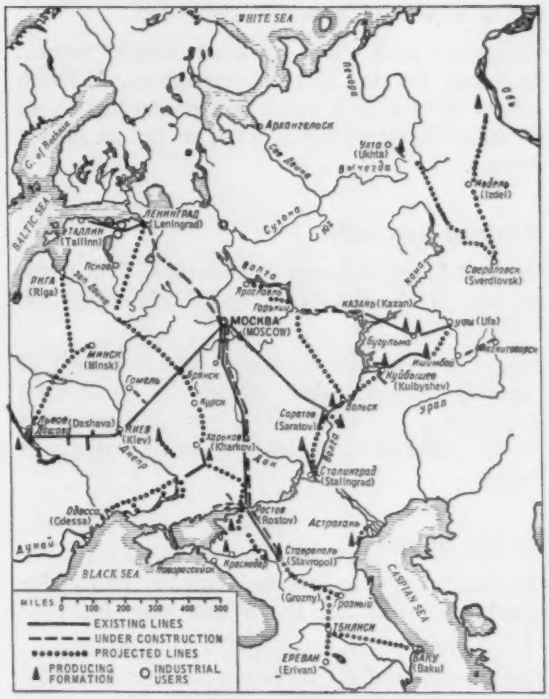
Informative but incomplete information on USSR gas industry up to November 1957. Total manufactured and natural gas output for 1955 was 365 billion CF. State goal for 1960 is 1420 billion CF; estimates indicate, however, that production for this date will be 2140 billion CF and 4620 billion CF in 1965. Natural gas soon will be supplied to Leningrad and Tallinn to replace shale gas currently used. Underground gasification continues with new stations being built near Moscow, the Don Basin and in Uzbekistan. Production costs have been reduced by 50% by using natural gas for the production of formalin, acetylene and ammonia. Reduction of railroad tonnage is an important reason for construction of new lines. New gas fields in Azerbaijan and Middle Asia soon will be exploited for gas supply to Tbilisi, Yerevan, Bukhara and Tashkent. J. W. Penney

Canadian Exports

Canadian Gas Development Threatened. *World Petrol.* 29, 39, 72 (1958) Jan.

Exploration of the reasons behind the Canadian prime minister's statement that no further permits for natural gas export will be considered until the royal commission on energy requirements and

GAS PIPELINES OF THE USSR, 1957



(*From* Bokserman, Y. I., *left*)

sources has made its studies, conducted all its public hearings across the country and reported on its findings.

Control of Operations

Rate Economic Factors by Importance. K. Finlayson. *Chem. Eng. 65*, 151-4 (1958) Jan. 13.

Analysis of all economic factors under the control of operating supervision, using the disciplines developed for studying computer applications, develops a powerful but simple tool to help supervision improve their control of operations.

Cost Accounting

Which Depreciation Method Is Best. J. Gaffney. *Petrol. Refiner 36*, 137-46 (1957) Dec.

Some of the thinking in the field of cost engineering, a presentation of the generalized mechanics and limitations of depreciation calculations, the exploration of the profit statistics of industry and an insight into the various concepts of depreciation effects in project evaluations are included in this article. The effect of inflation on replacement also is considered.

Cost Comparison by Capitalized Cost. F. C. Jelen. *Petrol. Refiner 37,* 195-201 (1958) Jan.

Capitalized cost offers an exact method without limitations for making cost comparisons. Although infinity is used as a common denominator for all service lives, the comparisons are correct for limited periods.

Contract Research

Contract Chemical Research in Europe. F. C. Croxton and M. A. Barnick. *Chem. Eng. Progress 54,* 59-63 (1958) Jan.

Report on contract research, introduced to 17 European countries since World War II. Includes discussion on facilities and volume, and comments on the activities of Battelle Memorial Institute in Europe.

Florida Supply

Natural Gas Will Invade Nation's Last "Undeveloped" Frontier. D. Wright. *Gas 34, 53-7* (1958) Jan.

Florida, only major U.S. population area still without natural gas service, will have its unserved market developed by the natural gas industry in 1958. The Coastal-Houston pipeline, which represents the joint efforts of two companies, will run from the Rio Grande valley to a point south of Miami—a distance of 1417 miles. Initial average capacity daily will be 275 MMCF, half of which will be available to distribution companies and to direct industrial accounts. Result: for the first time in years, Florida's gas distribution companies will have an abundant supply.

Gas and Electric Costs

Criteria for Determining Costs of Gas and Electric Service in Military and Public Housing Projects. C. A. Brandt. Washington, D. C.: H. Zinder & Assoc., Inc., 1957. Order from A.G.A., New York; *A.G.A. Monthly 40,* 6-8 (1958) Jan.

Three typical plans for furnishing utility service were studied in a program designed to furnish criteria for estimating gas and electric requirements in multiple dwelling housing projects. Plan A is an all gas plan; B is a combination gas and electric plan, and C is an all electric plan. Coincidental demands, cost based on rates for 35 typical communities, maintenance cost of appliances and efficiency of performance were used to confirm that gas is the less expensive fuel.

German Gas Industry

Gas in Federal Germany. *Gas J. 293,* 78-80 (1958) Jan. 8.

Summary of the development of gas supply and consumption in Federal Germany during 1956. Significant increases: coke production in coke ovens increased by 7.8% against an increase of coal products of only 2.8%; coke oven gas production increased by 5.5%. Town gasworks increased the amount of gas supplied from their own production by 4.9%.

Industry Progress

New Heights on All Fronts. R. W. Otto. *Gas Age 121,* 19-22 (1958) Jan. 9; *Gas 34,* 62-4 (1958) Feb; *Pipe Line News 30,* 20, 22 (1958) Jan; *A.G.A. Monthly 40,* 3-5 (1958) Jan.

New records were established by the gas industry in 1957; 7% increase in customers; 8% increase in house heating customers; total sales amounted to 74.36 billion therms; revenues rose 4.2%; recoverable reserves of natural gas stood at 237.8 trillion CF, and storage was up 1.5 trillion CF.

Industry Prediction

1958 Seen as Year of Growth. *Amer. Gas J. 185,* 10-9 (1958) Jan.

Twenty-one gas industry leaders predict bright future. Demand is large, millions of dollars are earmarked for expansion plans, customer total is increasing rapidly, better appliances are being developed, air conditioning program is on upswing and sales programs are aggressive.

Labor Cost

Do You Need a Labor-Meter? F. D. Macy. *Petrol. Refiner 37,* 137-40 (1958) Jan.

The Shell Oil Company has devised systems whereby labor performance can be measured.

Maintenance Improvement

How Good Design Reduces Maintenance. H. P. Evans and D. Bromley. *Petrol. Refiner 37,* 124-8 (1958) Jan.

Points for the designer to remember if his products

are to make maintenance a quicker, more efficient program.

Upgrade Your Maintenance Personnel. G. O. Pitts and L. H. O'Donnell. *Petrol. Refiner 37,* 129-31 (1958) Jan.

Careful selection, directed training and systematic upgrading are the essential ingredients of an effective program for development of maintenance personnel. Such a program is essential for the protection of plant investment today when the responsibility for operational continuity is shifting from production toward maintenance personnel.

Market Research

How to Find Tomorrow's Customers. H. Tuchman. *LP-Gas 18,* 34-8 (1958) Jan.

Market research takes the "guess" out of "guesstimate" by (1) establishing realistic market potentials; (2) providing an understanding of a market's needs; (3) shaping future sales, management and operational plans; (4) helping to devise methods of reducing sales resistance, and (5) pointing out areas vulnerable to competition.

Memphis Decision

Industry Outlook Under the Memphis Decision. J. K. Kuykendall. *Gas Age 121,* 40-3 (1958) Jan. 23; *A.G.A. Monthly 40,* 22-4 (1958) Jan; *Am. Gas J. 185,* 14-6 (1958) Feb.

Under the Memphis decision, a pipeline company cannot file a new rate even if the purchaser agrees that this might be done. It places in jeopardy some $217 million being collected annually by pipelines and endangers the solvency of many. Constitutional recourses, however, still remain.

Multiple-Base Supply

Coal, Oil and Underground Storage as Basis of Gas Provision for a City. G. Duwel. *Erdöl u. Kohle 10,* 843-51 (1957) Dec.

Economic provision for a city is possible by directing the gas production to a many-sided basis of raw materials and an optimum utilization of the available production units. The operational connection of the refinery and natural gas cracking units as well as the reservoir storage is discussed.

Public Relations

The Industry's Greatest Challenge. J. J. Hedrick. *Gas Age 121,* 37-8 (1958) Jan. 9.

Consumer must be convinced that gas industry wants to keep him supplied with its product at a reasonable price.

Punched Card Billing

Therm Billing Becomes Routine With Punched Card System. C. V. Griffith. *Gas 34,* 66-71 (1958) Feb.

Expansion of service by the Portland (Ore.) Gas & Coke Co. necessitated introduction of labor-time saving features. Punched card accounting equipment has played a major role in overcoming administrative problems.

Research Management

High-Command Strategists: A Better Way to Use Research Brainpower. *Chem. Week 82,* 52-4, 56 (1958) Jan. 25.

Two chains of command at Smith, Kline & French enable more effective use of research brainpower. One branch is strictly administrative; the other, technological, headed by a technology director who is aided by a board of strategists. On technical matters, bench chemists are guided by the board as well as by section heads. This poses some problems, but system seems ideal for firm like SK&F.

Safety Planning

Study of Gas Explosions and Fires. *Quarterly Nat. Fire Protection Assoc. 53,* 160-94 (1958) Jan.

Study of 140 explosions, 23 of which were caused or spread by the ignition of gas. Prepared with the cooperation of gas industry, study points out that proper installation, maintenance, repair and operation of gas piping and equipment can prevent costly fires.

Plan for Disaster. *Petrol. Refiner 36, 102-14* (1957) Dec.

Studies of various disaster plans indicate the organization and procedures for plant protection against disaster. Topics include staff assignments for coordination, area control and special disaster services. Advance training and planning for disaster is stressed. Special chart includes objectives of protection and classification of fires.

2. ENERGY SUPPLY AND ECONOMICS

Gas-Electric Comparison

Sixty-Six Families Prove Economy of Gas Service. C. C. Turner. *Gas Age 121,* 16-20 (1958) Jan. 23; *LP-Gas 18,* 39-44 (1958) Feb.

Survey of families living in housing projects at Sidney, N. Y., proves the results of the Beltsville tests erroneous. The latter test, which favored electricity, overestimated the gas demands for cooking and water heating by 20.3%. The Sidney tests, conducted under actual conditions, proved that LP-gas users consumed 116.85 lb (average) a month, 24.43% less than claimed by Beltsville tests, which were conducted under laboratory conditions.

Drilling Lag

Key States Drilled Fewer Gas Wells. *Oil Gas J. 56,* 158-9 (1958) Jan. 27.

Drilling activity lagged behind marketed production during 1957. Well completions dipped to 3860, 255 less than the record established in 1956, while marketed production increased 5.5%.

Rigs In Use Reflect Decline in Drilling. *Oil Gas J. 56,* 239-40, 44-6, 49, 52, 54, 56-7, 59-62, 64, 67, 71 (1958) Jan. 27; *Gas Age 121,* 20 (1958) Feb. 6.

Breakdown of drilling activities by rotary-rig activity by years and by states; footage drilled and completions accomplished, by states, in 1957; wildcat completions and drilling depths; breakdown of footage of U.S. and Canadian wells; location of wildcat explorations and location of field development wells, and the well tally by county showing footage and results.

Liquid Reserves

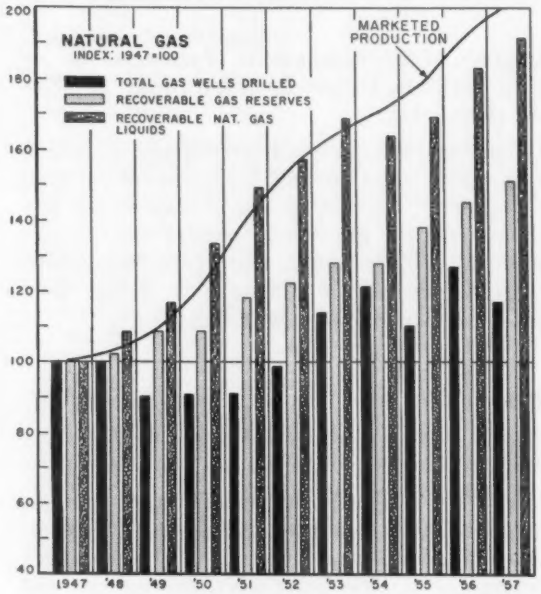
Liquid Reserves 39.67 Billion Barrels. *Oil Gas J. 56,* 160-2 (1958) Jan. 27.

West Texas, the Rocky Mountains and South Louisiana share the credit for boosting reserves of crude oil and natural gas liquids to 4040 million barrels, a net gain of 1124 million barrels over the 1956 figure.

Where the Nation's Oil Is Stored. *Oil Gas J. 56,* 163-8 (1958) Jan. 27.

Breakdown of the estimated proved remaining reserves of crude oil and condensate by major fields according to geographic location.

NATURAL GAS SALES DOUBLED IN 10 YEARS
DRILLING AND RESERVES FAIL TO KEEP PACE



(*Adapted from* Key States Drill Fewer Gas Wells, *left*)

Petroleum Demand, 1958

Demand Will Hit 9.47 Million Barrels. *Oil Gas J. 56,* 186-7 (1958) Jan. 27.

Predictions of domestic and foreign demand indicate that the percentage increase in the former category will be 3.8 while foreign requirements will increase about 1.2% over the 1957 figures. A breakdown of the 1958 forecast by quarters is included.

LPG Production

Gas-Liquids Output Hits a New High. *Oil Gas J. 56,* 176-8 (1958) Jan. 27.

Expanding markets for products, additional processing applications, greater use of pipeline, barge and tanker transportation and a trend toward the sale of lower-vapor-pressure natural gasoline (which means less butane in the natural gasoline and more butane for LPG production) all contributed to record output of natural gas liquids in 1957.

Petrochemical Slowdown

Ethylene Still Leads Growth of Petrochemicals. *Oil Gas J. 56,* 179-80 (1958) Jan. 27.

Capital expenditure expectations for the chemical and allied products industry are about 5% lower than for 1957. Sharpest cut is anticipated for petrochemical portion of industry. In the case of ethylene, changing raw material sources is a major factor for this prediction.

Nuclear Boilers

How Tubes Compare for Nuclear Reaction Boilers. P. S. Otten. Part 1. *Power 102,* 80-3 (1958) Jan.; Part 2. **Design of Six Boilers for Gas-Cooled Nuclear Power Reactors.** *Ibid.* 80-3, Feb.

Design, production and efficiency of various types of finned and extended-surface tubes for heat exchange in nuclear boilers is discussed in Part 1. In Part 2, the arrangement of tubes and shells for handling reactor gases is outlined. Cross-flow, bayonet head-up, U-shell kettle and bayonet head-down designs of shell, tube and heads are diagrammed for 50 to 5000 psig gas pressures.

Euratom

Nuclear Power in Europe. A. W. Kramer. *Metal Progress 73,* 76-82 (1958) Jan.

Scarce fuel and energy resources in Europe mean that nuclear power there is much more necessary than in the U.S. Great Britain is already launched on an ambitious program and the formation of the European Atomic Energy Community by six of the central European nations will accelerate the development of nuclear power on the continent.

British Energy Supply

The Ministry of Power Statistical Digest for 1956. J. G. King. *Gas Times 92,* 40-1 (1958) Jan.

British statistics for 1956 on consumption and distribution of coal, other solid fuels, gas, oil, and electricity, compared with 1955, on a coal equivalent basis.

Chinese Petroleum

China's Oil Progress. G. G. Rosu. *World Petrol. 29,* 47-8, 50, 52, 56, 58 (1958) Feb.

One of the world's richest countries in oil reserves, China, is underdeveloped because of lack of steel and an economic system aimed at self-sufficiency. During first five-year plan (1953-57) all activity was concentrated in the northwest basins including Sinkiang, Kansu and Shensi. To date, deepest well is 10,000 ft. Production in 1957 was 30,000 bbl/day, seven times higher than 1952, but low enough to put China at the bottom of the list of oil-producing countries.

Colombia Oil Geology

Two Major Provinces Predominate in Colombia's Geological Features. W. C. Hatfield. *Petrol. Eng. 30,* B-21-5, 9 (1958) Feb.

Average production for Columbia during 1957 was 128,000 bbl/day from 15 fields and an average depth of from 5000 to 7000 ft. Country is easily divided into two provinces. Eastern is flat lowland which reflects a gentle westerly dip of the essentially continental Tertiary sedimentary section resting on pre-Cretaceous and crystalline Shield rocks; smaller western province is mountainous with deep intermontane strike valleys and marine and volcanic Cretaceous and marine and continental Tertiary rocks resting on essentially pre-Cretaceous red beds and crystalline rocks. Production to date is mainly from western province.

3. NATURAL GAS AND PETROLEUM PRODUCTION

Drilling

Keys to Successful Competitive Drilling. Part 6B. R. A. Bobo, G. S. Boudreaux, and R. R. Angel *World Oil 146,* 127-9, 32-3, 36 (1958) Jan.

This is the concluding chapter on the series which will appear in book form. The authors have shown the current status of reduced pressure drilling. Judicious use of this method can guarantee large savings to the operator and drilling contractor. Cooperation and exchange of information by all concerned can improve the method even further, overcome the problems and insure larger savings in the future.

AAODC Makes First Report on Study of Weight/Speed/Penetration. E. L. Decker, et al. *Petrol. Eng. 30,* B-40, 2-3, 6, 8, 50, 2 (1958) Jan.

Analysis of tests conducted jointly by contractors, oil operators, suppliers and manufacturers in a

continuing program aimed at achieving optimum drilling rates. New procedures are suggested.

Drillers Are Ready to Sink Tools to 25,000 Ft. *Oil Gas J. 56,* 234, 36 (1958) Jan. 27.

Continuation of a chain reaction started in 1956, of wells more than 20,000 ft. deep, is likely to be the big drillings news of 1958. Probably 20 or more rigs in country are capable of handling drill pipe and casing to such a depth. Trouble spots such as mud, cement and pipe are not insurmountable.

Air Drilling Is Possible Through Long Intervals of Open Hole. R. E. Larson and O. Peters. *Oil Gas. J. 56,* 105-6, 8, 11, 14 (1958) Feb. 10.

Geophysical survey of Disturbed Belt in northern Montana shows that the complicated surface disturbance dies out with depth. Conoco saved an estimated $100,000 on test well in this tough drilling area which recently received considerable interest with the discovery of three fields in Southwestern Alberta.

How Pan American Drilled Texas' Deepest Well . . . World's Second Deepest. E. McGhee. *Oil Gas J. 56,* 80-4 (1958) Feb. 3.

Bottomed at 21,687 ft. while drillers were looking for the Devonian strata, the L-CS University is second in depth only to Louisiana's well. Mud hydraulics, equipment, drilling and casing programs are summarized.

Safety, Profit and Drilling. D. L. Morgan. *World Oil 146,* 56-7, 8 (1958) Feb. 1.

Comprehensive safety studies prove relationship between safe operation and profit.

Effect of Pressure on Rock Durability. (T.P. 4702) J. R. Eckel. *J. Petrol. Tech. 10,* 1-6 (1958) Jan.

Calibrated tests of a laboratory drill rig, which permits the application of hydrostatic, terrastatic and formation pore pressures to a rock sample for drilling under controlled conditions, indicate qualitative agreement with field tests on the effect of weight on bit, rotary speed and rate of circulation on drilling rate. Tests with water and air as drilling fluids, indicate that in drilling saturated limestone, a pressure differential between hydrostatic and formation pressure is the only pressure which affects drilling rate.

Drilling Mud Practice

High Mud Pressures Increase Penetration. R. A. Watson and R. S. Sullins. *World Oil 146,* 113, 15-18 (1958) Jan.

Substantial increases in penetration rates at depths below 10,000 ft in South Louisiana have been realized by increases in pump hydraulic horsepower from 500 to over 1500. Hydraulic horsepower increases aid penetration rates with weighted muds as well as muds of normal weight.

Exploration

East Texas Basin Offers New Type Fields. J. A. Kornfield. *World Oil 146,* 104-06, 09-10 (1958) Jan.

Approximately five billion barrels of proved, developed oil will be recovered from the East Texas Basin. Recent discoveries have directed exploration toward (1) flanks of interior salt domes; (2) deep formation of fault zones, and (3) shallow formations along south rim of basin.

Need for New Oil Spurs Exploration in Israel. *World Oil 146,* 180 (1958) Jan.

Seismic operations in the Negev desert indicate that an accelerated program will pay off.

We Give You Our "Uplook" . . . On What's Ahead for Exploration. *Oil Gas J. 56,* 204-6, 8, 10, 14, 17, 18, 20-1, 23-4, 29-30, 33 (1958) Jan. 27.

Brief review of 1957 exploration achievements, interspersed with predictions of what's ahead in 1958 and beyond. U.S. exploration activities and those north of the border are covered.

Offshore Oil To Be Sought on U.S. Side of Lake Erie. H. T. Brundage. *World Oil 146,* 74-6 (1958) Jan.

Leasing of Ohio and New York offshore areas is expected now that Pennsylvania has leased tracts to the New York State Natural Gas Corporation. Drilling in lake might result in linking of U.S. fields with pools already developed in Canadian waters.

Dip Migration Improves Depth Calculations. W. B. Robinson. *World Oil 146,* 45, 7-9 (1958) Feb. 1.

Drilling depth predictions can be improved by applying dip migration principles to calculations. Explanation of the effect of dip migration on the depth and dip of the reflected horizon.

Fracturing

Evaluation of Fracturing Fluids. T. O. Allen and E. W. Hough. *Producers Monthly 22,* 16-9 (1958) Jan.

Discussion of tests, conducted with specially designed laboratory equipment under simulated well conditions of temperature and pressure, to determine the changes in formation permeability which might be caused by injection of various fracturing fluids. Results indicate that certain types of fracturing fluids exhibit a greater tendency to plug the formation matrix than other competitive fluids.

Logging

Reservoir Parameters from the Gamma-Ray Log, Cardium Sand, Pembina Field. T. P. Cutmore. *Oil Gas J. 56,* 97-100 (1958) Feb. 3.

Determination of net pay in the Pembina pay zone is accurately achieved by the gamma ray-MicroLog. With this technique, considerable money was saved on field wells because unnecessary coring was eliminated.

Surface Gamma Ray Logging of Subsurface Cores. R. E. Jenkins and M. C. Meurer. *Petrol. Eng. 30,* B-64, 6, 8, 70 (1958) Feb.

New technique monitors the level of gamma radioactivity of subsurface cores after they are removed from wells. Primary function of surface gamma ray log is one of correlation with down-hole gamma ray logs. Accurate pin-pointed core intervals and lost core sections are provided as well as aid in eliminating depth discrepancies and excessive perforations.

Why Those Low Lateral Readings? M. Martin and K. S. Kunz. *Oil Gas J. 56,* 88-92 (1958) Feb. 10.

If some pay sands show abnormal readings it may be because most shales are anisotropic and may often be more anisotropic than the sands—except those containing thin laminations.

Petroleum Recovery

Production of Oil by In Situ Combustion. H. O. Dixon (assigned to Phillips Petroleum Co.). U.S. 2,818,118 (1957) Dec. 31.

Method for recovering hydrocarbons from a gas-pervious underground formation at a selected level through a well utilizes the technique of depositing small particles of solid combustible material, having good electrical conductance, passing a current between the particles to heat them to ignition temperature, thereafter supplying a free-oxygen-containing gas to the fractured area so as to cause the particles and the hydrocarbons to ignite, the resulting combustion heat distilling and thinning the oil to permit free flow.

Initiation of Combustion in a Subterranean Petroleum Oil Reservoir. R. L. Koch (assigned to Socony Mobil Oil Co.). U.S. 2,818,117 (1957) Dec. 31.

Provision of a method of initiating and maintaining combustion in a subterranean oil reservoir. Heat, supplied by means of a heater positioned in the input well, and air, supplied in sufficient amount to effect combustion of the oil, are furnished to the reservoir until the rate-pressure ratio of the air decreases to below its original value.

New Techniques for Improving Oil Recovery. P. D. Torrey. *Producers Monthly 22,* 27-40 (1958) Jan.

Discussion of recently developed methods for improving oil recovery techniques includes Orco Process, high pressure gas injection process, condensing gas drive process, injection of inert gases, the Spearow vertical gas drive process, thermal recovery and the application of surface chemistry.

Two Ways to Better Oil Recovery. C. D. Russell. *Oil Gas J. 56,* 117-21 (1958) Feb. 10.

Gas-driven solvent bank process and enriched gas-injection, two solvent processes which both use only a small quantity of LPG, are potentially capable of recovering much more than 1 bbl. of oil per barrel of LPG.

Reservoir Engineering

Reservoir Oil Resaturation with Gas During Pressure Build-Up. M. G. Chaney. *J. Petrol. Tech. 10,* 11-4 (1958) Jan.

Pressure-volume relationship of confined oil and gas was determined by application of both increasing and decreasing pressures. Then the same hydrocarbon fluid was given a routine PV analysis over the same pressure and temperature ranges. Actual field tests also were conducted. It was con-

cluded that for both the laboratory and reservoir tests, the dispersed gas in the oil maintained the oil saturated during pressure increase.

Miscible Displacements of Reservoir Oil Using Flue Gas. H. A. Koch and C. A. Hutchinson. (T.P. 4704) *J. Petrol. Tech. 10,* 7-10 (1958) Jan.

Discussion of some new concepts of the high gas injection process where it is proposed that flue gas can be substituted for hydrocarbon gas without sacrificing the goal of miscibility.

Further Indications of Pore Doublet Theory. W. Rose and J. Cleary. *Producers Monthly 22,* 20-1, 24-5 (1958) Jan.

Evaluation of VISCAP method indicates that there is a balance point, but there also is perhaps little likelihood that advantage can be taken of this in practical field operations. Theoretical deductions present some insight into the anamolies of previously reported field and laboratory data.

Sahara Oil

Sahara Oil Begins Moving to Market by Pipe Line. G. Halsell. *World Oil 146,* 97, 9 (1958) Feb. 1; *Oil Gas J. 56,* 81 (1958) Feb. 17.

Ten-in. pipeline connecting Algeria's Hassi-Messaoud field to Touggourt has been completed. From there oil will be shipped by rail to Philippeville on the Mediterranean coast. Ultimately, large diameter pipelines will be the link between the Hassi-Messaoud and Edjele fields to Mediterranean ports.

Water Injection

New Trends in Treating Waters for Injection. J. W. Watkins. *World Oil 146,* 143, 45-50 (1958) Jan.

Recent developments in treating brines for subsurface injection include increased emphasis on more complete separation of oil from the accompanying produced water and use of closed injection systems. Although there has been progress in solving injection water treating problems, available information pertinent to other problems is scanty and incomplete. Additional research work is justifiable.

Well Practice

Non-Graphical Solution of Back-Pressure Tests on Gas Wells. H. N. Dunning, R. W. Smith and C. J. Walker. *Petrol. Eng. 30,* B-77-8, 80 (1958) Jan.

Calculation of gas well characteristics directly from back-pressure equation, using computers to save time, supplies unique values of data normally obtained by tedious graphical approximation.

Well Servicing: A Giant Now and Still Growing. R. O. Frederick. *Drilling 19,* 121-2 (1958) Jan.

Improve techniques and equipment, mounting emphasis on secondary recovery and increasing demand have made well servicing a full partner in the oil business.

New Solution Proposed for Dual Completions in Citronelle Field. H. G. White and R. C. MacElvain. *World Oil 146,* 74-6, 8 (1958) Feb. 1.

Money-saving process, called Scotch commingling, consists of a single tubing string with one-way valves to allow production from upper and lower zone to commingle without possibility of return flow to the formation. This could benefit operators with dual-completion problems. Since state laws require that upper and lower reservoirs be treated as separated units, this could benefit operators with dual completion problems, as double tubing and pumps and special fittings add considerably to the cost of producing the poorer lower formation.

Let's Re-Examine Casing Design Considerations. R. J. Stoup. *World Oil 146,* 60-2 (1958) Feb. 1.

Those responsible for designing and running casing strings have relied on handbooks and charts without a full understanding of basic reasons for design procedures. Acceptance of "safety factors" and hedging on loading considerations for collapse, bursting and tensile strength has been the common fallacy. Design factors should be modified, and the modification proved or disproved by field experience.

Well Testing

Automatic Well Testing. H. A. Saye. *Oil Gas J. 56,* 102-05 (1958) Jan. 6.

Automatic well testing is a relatively new field. However, use of telemetering equipment to transmit well test and production information from numerous tank batteries to a central location is being designed and developed. Other phases of the operation which can be automated include direct processing of production data into computers which will make out royalty checks.

4. GAS CONDITIONING AND LPG RECOVERY

CO_2 Removal

Which CO_2 Removal Scheme Is Best? J. F. Mullowney. *Petrol. Refiner 36,* 149-52 (1957) Dec.; *Oil Gas J. 56,* 93-9 (1958) Feb. 10.

Seven different processing schemes for removing CO_2 from gas streams were compared for investment and operating costs. The methods included single or multiple scrubbings with the following aqueous agents: (1) Amine (MEA); (2) amine and caustic: (3) hot carbonate and amine; (4) hot carbonate, amine and caustic; (5) hot carbonate, ammonia and caustic; (6) water and amine, and (7) ammonia and caustic.

Dehydration

Dehydration of Gaseous Streams. S. A. Wilson. U.S. 2,818,454 (1957) Dec. 31.

Dehydration of a natural gas stream, consisting of passing the gas stream through a liquid bath to transfer a portion of the heat of the stream to the liquid bath, removing the free water and hydrocarbon condensates from the stream, cooling the remaining vapor components to substantially hydrate formation temperature, expanding the cooled gas to form hydrates, precipitating the hydrates into the liquid bath, directing the separated free water and hydrocarbon components directly into the liquid bath above hydrate formation temperature for melting the hydrates and separating the water and hydrocarbon components of the liquid bath for separate removal.

Dehydration of Natural Gas Streams and Cold Separation Units Therefor. S. A. Wilson. U.S. 2,820,833 (1958) Jan. 21.

Dehydration of raw natural gas is achieved by passing warm gas into a second-stage coil surrounded by a cooling bath which is thereby warmed to a hydrate-melting temperature. The heat exchange coil discharges the cooled gas to a first-stage separator where water, mud and paraffins settle out, and the gas is passed through a pressure-reducing choke back to the second-stage vessel into the space above the coil and bath. Here the condensed hydrates separate and dissolve in the bath without mud fouling while the dehydrated gas can be withdrawn.

H_2S Removal

Purification of Gases with an Amine Impregnated Solid Absorbent. V. Haensel (assigned to Universal Oil Products Co.). U.S. 2,818,323 (1957) Dec. 31.

Continuous method for purifying an acidic gas-containing stream which comprises passing the stream into the lower portion of a contacting zone containing dry, subdivided solid particles, comprising an adsorptive solid and an aliphatic amine at a velocity sufficient to maintain the solid in a fluidized stream.

A New Desulfurization System for a Medium Capacity Gas Plant. W. Weyh. *Das Gas- und Wasserfach 49,* 1228-34 (1957) Dec. (German text.)

Investigations conducted at the Leer Gas Plant in Germany indicated the necessity of constructing a continuous desulfurization system. The article includes preliminary drawings and calculations as well as a summary of the results obtained from the 3½-year old equipment.

Hydrocarbon Recovery

Method of Separating the Fractions of a Gaseous Mixture in a Gas Rectifying System. H. Fokker, J. W. L. Kohler and H. Rinia (assigned to North American Philips Co., Inc.) U.S. 2,820,352 (1958) Jan. 21.

Gaseous mixtures are rectified by thermal contact with a medium in a rectifying column, said medium being heated or cooled by a compression-expansion refrigerating cycle.

Methane Recovery

Methane Segregation Method and Product. N. H. Ceaglske (assigned to Minnesota Valley Natural Gas Co.) U.S. 2,820,071 (1958) Jan. 14.

Methane is recovered specifically from mixtures containing other hydrocarbons by contacting the gas stream with wetted hydroquinone to form a stable clathrate or inclusion compound. When dissolved in water, alcohols or ethers, this complex releases CH_4, thus permitting batch regeneration of hydroquinone for reuse. A maximum yield of 0.67 CF CH_4/lb solid is possible, for CH_4 storage or cyclic CH_4 removal processes.

Organic Sulfur

Strong Case for Organic Sulphur Removal. F. Broomhead. *Gas World 147,* 142-5 (1958) Jan. 11.

Sulfur content of coal gas must be reduced if it is to remain competitive with alternate fuels of low-sulfur content. Suggested level is less than 3 grains per 100 CF.

Oxide Process

New Mechanical Oxide Discharger. *Gas J. 293,* 180-2 (1958) Jan. 22.

Discharge and handling of oxide purifying material from trays of the tower system has been improved and made less expensive by mechanized handling and some redesign of the trays.

5. NATURAL GAS TRANSMISSION

Automatic Stations

Automatic Pipeline Moves Nearer. *Oil Gas J. 56,* 184-5 (1958) Jan. 27.

Although there were no revolutionary developments in technical progress, the industry did reach milestones in all branches. Three types of drives for centrifugal compressors were involved in major gas-transmission progress.

Canadian Pipeline

Canada's Westcoast Gas to USA. L. O. Rowland. *World Petrol. 29,* 36-41 (1958) Feb.

Westcoast Transmission Co. Ltd. has 649-mile, 30-in. pipeline from its main compressor station and gas processing plant near the Ft. St. John gas field to Sumas, 50 miles southeast of Vancouver. Entire line is situated in British Columbia and the fields from which it draws its gas supply are largely in the same province.

Compressor Engines

Preventive Maintenance Practices for Gas Engines. H. Ramsey and D. M. Taylor. Part 1. **Sources of Trouble.** *Petrol. Eng. 29,* D-34-5, 37-8, 40 (1957) Dec.; Part 2. **Operating Inspection Records.** *Ibid 30,* D-38-43 (1958) Jan.

Detailed review of maintenance problem and sources of engine trouble, classified under air, fuel gas, water, lubricating oil, improper temperatures and wear. In Part 2 types of inspection and records are outlined, with emphasis on their use in minimizing shutdowns.

Construction Record

Pipeline Building Has Biggest Year. *Oil Gas J. 56,* 182-3 (1958) Jan. 27.

During 1957, companies in the U.S. and Canada showed the following mileage for pipeline construction: natural gas, 15,400 miles; crude, 4800 miles; products, 2900 miles. Estimates for 1958, usually 10-20% lower than mileage actually laid, are: natural gas, 14,700 miles; crude, 3000 miles; products, 1700 miles.

Lubrication Research

Russian Research on Lubrication and Wear. *Lubrication Eng. 14,* 27-31 (1958) Jan.

Survey of Russian research activities indicates they are actively engaged in studies of the kinetics of lubricant additive action. Article lists Russian organizations where lubrication research is conducted, scientific Russian publications and translation services in the U.S.

New Pipelines

Tough Going All the Way. G. Kinney. *Oil Gas J. 56,* 85-7 (1958) Feb. 3.

The 166-mile, 10-in. pipeline from Griffith, Ind., to Muskegon, Mich., represents a victory for the Muskegon Pipe Line Corp. over swamps, heavy timber and a right-of-way tightrope walk through high-priced agricultural, residential and industrial areas.

Ethylene Pipeline is Completed. *Pipe Line News 30,* 46-7, 57 (1958) Jan.; *Petrol. Eng. 30,* D-42-4 (1958) Feb.

First interstate pipeline to transport high purity ethylene extends from Lake Charles, La. to Orange, Tex. Constructed of German-manufactured pipe of 6⅝-in. diameter, it will operate at 1000 psig, although withdrawals will be made at 450 psig or less.

Pipelines

Boom Year For Pipe Line Work Forecast; 25,000 Miles New Lines Planned. *Pipe Line News 30,* 33-45, 48 (1958) Jan.

Collected comments of various pipeline company executives, with tabulations on construction in 1957 and work planned for 1958.

Construction to Hit Record 26,072 Miles in 1958. M. A. Judah. *Pine Line Ind. 8,* 36-7 (1958) Jan.

Survey of 228 pipeline companies indicates a 19% increase in U.S. pipeline construction is anticipated for 1958. Free world countries outside U.S. expect a 50% increase over 1957 activity. This forecast includes pipe sizes, station additions and prime movers to be installed.

Double Joining Speeds Construction of Arabian Line. *Pipe Line Ind. 8,* 56-9 (1958) Jan.

Efficiency and flexibility are features of Aramco's new double-ending yard in Saudi Arabia. Assembly line techniques require minimum of supervision. Crane, used for loading and unloading pipe, is only heavy equipment.

Pipeline Blind Device. C. J. Gibbs (assigned to California Research Corporation). U.S. 2,815,771 (1957) Dec. 10.

A pipeline blind fitting, or shut-off device, which can be installed in a minimum of space between two flanged pipeline sections, is claimed. It is comprised of a stiff backing plate carrying two sets of annular rings with a circumferential O-ring seal which engages with the external rings. These external rings can be expanded by ring and pinion gears to seal against the O-ring.

Pipeline Costs

Pipeline Contractors' Costs. *Oil Gas J. 56,* 105-20 (1958) Jan. 20.

Special analytical survey based on data compiled from pipeline companies, contractors, manufacturers and dealers in equipment and machinery and costs indexes of the U.S. Department of Commerce.

Pipeline Stations

How to Protect Pipeline Stations Against 1. Lightning 2. Power-line Switching. *Oil Gas J. 56,* 103, 05-07, 10 (1958) Jan. 13.

Proper protection includes station-type lightning arresters at transmission voltage level for transformer supplying station; surge protection on station bus and power supply system has either dead line check relay or time-delay automatic reclosure.

Unattended Pump Stations on the Evangeline System. *Pipe Line News 30,* 30-2 (1958) Jan. Automatic operation of six engine-pumping units is a prominent feature in the Evangeline Product System's current expansion program. The 16-in. pipeline carries refined products from Port Arthur, Tex. to Baton Rouge, La., a distance of 189 miles. Operator at Port Arthur station controls operation of four stations.

6. GAS AND LPG STORAGE

Holders

The Operation, Maintenance and Repair of Gasholders. F. Richmond. *Gas J. 293,* 127-8, 31 (1958) Jan. 15.

The Wales Gas Board owns and operates 255 gasholders at 105 holder stations, their total capacity being 51 million CF. Based on the cost of 0.5 million CF gasholders, the present cost of replacing this holder capacity is 5.6 million pounds, excluding the cost of foundations and annual capital charges on this sum. This would add an amount of 400,000 pounds to the above figure. Careful maintenance and proper operation of gasholders will hold these costs to a minimum.

Liquefaction

Low Temperature Separation of Hydrocarbons. C. C. King. *Petrol. 21,* 59-60 (1958) Feb.

Discussion of new trends in solving the problem of liquefaction, including that in which normal petroleum refining practices are employed and refrigeration is treated as a service.

Liquefied Methane

Method for Stopping Leaks in Tanks. S. Beckwith (assigned to Constock Liquid Methane Corp.). U.S. 2,817,218 (1957) Dec. 24.

Sealing fluid (melted paraffin, H_2O, CO_2), forced into a hole bored at the point of leakage in the internal insulating lining of a metal walled, liquefied methane tank, congeals in the capillary pores of the lining.

Problems of Importing Natural Gas. A. R. Myhill. *Chem. & Process Eng. 39,* 24-6 (1958) Jan.; *Oil Gas J. 56,* 82 (1958) Feb. 10.

Limited quantities of coal suitable for carbonization have initiated investigations into new sources of gas in Great Britain. Negligible supplies of natural gas in Britain make importation a necessary consideration. Recent advances in the liquefaction, storage

and transportation of natural gas point to a possible way of easing the gas supply problems.

LP-Gas Storage

Sonar Caliper Simplifies LPG Storage Surveys. J. P. Chisholm and G. D. Patterson. *Petrol. Eng. 30,* B-90-2 (1958) Jan.

This accurate, time-saving simple data recording device surveys cross sections of underground caverns at various depths by measuring the time required for directional sound-impulse beams to travel from a downhole transmitter to the cavern wall and back. Storage well's volume can be calculated from these cross sections.

Temperature Measuring System for Underground Storage Cavern. L. R. Hunter and L. P. Meade (assigned to Phillips Petroleum Co.). U.S. 2,817,-235 (1957) Dec. 24.

Method for determining the temperature at various points in a pressurized underground cavern in which liquefied gases are stored employs resistance thermometry. Invention provides for determination above ground the temperature in an underground storage cavern and the temperature in both the liquid and gas phase of a liquefied gas stored in a pressurized underground cavern.

Is Your LPG Storage Safe? H. F. Jewson. *Gas 34,* 49-58 (1958) Feb.

Increased use of propane has caused many utilities to reevaluate their existing tank farms. Outline of seven major changes made by the Philadelphia Electric Co. to increase the safety of their installation.

Mining Caverns Through Small Shafts. *Construction Methods and Equipment 40,* 80-2, 5-6 (1958) Jan.

Crews, disassembled machinery and muck travel in 42-in. shafts 300 ft below surface to excavate honeycombs in rock to build caverns for storing 675,000 bbl of liquefied gas.

LP-Gas Tankers

Refrigerated Propane Tankers To Be Built in Italy. A. M. Stahmer. *World Petrol. 29,* 33 (1958) Jan.

LP-gas will be transported from the Persian Gulf to Europe by means of a vessel, designed in Livorno, which can transport refrigerated propane under normal pressure. Vessel will carry six midship twin tanks with a capacity of approximately 4000 tons liquid propane at a temperature of −45°C. The vessel also can carry 10,000 tons of oil or products in wing tanks.

Storage Costs

Gas Storage at the Point of Use. Stone and Webster Eng. Corp., 1957. New York: A.G.A.

Investigation of various methods of storing natural gas or natural gas substitutes for distribution companies at the point of use. Report includes general literature survey and a fundamental approach to the economics of seasonal peak shaving. Capacities from 1-1000 MMCF are considered with sendout rates of 5-400 MMCF/D. Low pressure holders, pressure vessels underground, gas liquefaction and natural gas substitutes are considered, and construction and operating costs are developed.

Underground Storage

The French Treatment of Coke Oven Gas for Underground Storage. *Gas J. 293,* 31-2 (1958) Jan. 1; *Corrosion Tech. 5,* 21 (1958) Jan.

Equipment and operations for injecting and withdrawing gas at the Beynes underground storage field are outlined. Removal of resinous components to protect sand formations is noted.

7. MANUFACTURED GAS AND CHEMICAL PROCESSING

Acetylene

New Cracking Process for Acetylene and Ethylene. G. A. Akin, T. F. Reid and R. J. Schroder. *Oil Gas J. 56,* 78-80 (1958) Jan. 13; *Chem. Eng. Progress 54,* 41-8 (1958) Jan.

Either air or oxygen can be used to support the generation of combustion gases, and propane and natural gasoline were used as cracking stocks. Tests conducted in a semiworks experimental furnace with an annual capacity of one million pounds of acetylene plus ethylene yielded conversions to acetylene and ethylene of 56 wt percent from propane and 58 wt percent from natural gas.

Mercury Photosensitized Polymerization of Acetylene. S. Shida, Z. Kuri and T. Furuoya. *J. Chem. Phys. 28,* 131-5 (1958) Jan.

Reaction products of the mercury photosensitized polymerization of acetylene included benzene as well

as polymer and hydrogen. Effect of acetylene pressure and light intensity on the rate, effect of pressure on the formation of hydrogen and benzene, and effect of temperature on the rate of benzene formation were investigated. The fraction of acetylene reacting to form benzene was constant at 0.29 in the range of the acetylene pressure studied. The quantum yield of the overall reaction was 4.8 including the yield of benzene, and 4.3 excluding it. Reaction mechanism is discussed.

Production of Acetylene. J. L. Bills (assigned to Union Oil Co. of Calif.). U.S. 2,816,942 (1957) Dec. 17.

Improved acetylene production by partial oxidation is obtained by preheating a mixture of natural gas (30%) with air (70%) to incipient reaction (1100°C) in a packed bed of non-catalytic particles (porcelain, carborundum) at a space velocity of 5000-40,000 vol/hr, then adding hydrogen-containing gas, preheated in the annular channel between the central packed bed and the furnace, to the reaction zone for acetylene production at a controlled temperature between 1250°-1500°C.

Aldehydes

Incomplete Oxidation of Methane-Propane Mixtures. S. F. Gudkov and V. P. Fedulova. *Gazovaya Prom. No. 10,* (1957) 32-9.

Description of laboratory tests and pilot plant operation for the process of incomplete, catalytic (NO) oxidation of mixtures of methane and propane for formaldehyde production. Yield of CH_2O reported as a function of reactor temperature, oxygen concentration, propane content and NO content. A mixture of 80% methane and 20% propane, on the one pass through the reactor, gave an 80% greater yield of formaldehyde than obtained with methane only. This is a continuation of work previously reported. J. W. Penney

Aromatics

Aromatics Separation Process. I. W. Mills (assigned to Sun Oil Co.) U.S. 2,819,326 (1958) Jan. 7.

Aromatics, adsorbed selectively on a packed bed, are washed with pentane, desorbed under pressure in a water-soluble desorbent (acetone, methanol). The bed is depressurized to boil out the desorbent, and the desorbent stream is contacted with water to separate the aromatics as an oil phase.

British Chemical Expansion

Britain's Petrochemical Industry. *Petrol. 21,* 41-4 (1958) Feb.

Review of three important British companies, the British Petroleum Co. Ltd., Imperial Chemical Industries Ltd. and the Shell Chemical Co. Ltd., including growth, manufacturing capacity and future plans.

Carbon-14 and Pentanes

C^{14} Hot Atom Chemistry of n-Pentane and Isopentane. C. F. MacKay and W. F. Libby. *J. Am. Chem. Soc. 79,* 6366-9 (1957) Dec. 20.

Studies have been made of the reactions of C^{14} atoms of velocities corresponding to energies up to 40,000 electron volts in liquid n-pentane and isopentane at about room temperature. Test results yielded a wide variety of hydrocarbon formation. Hexane and pentane isomers were identified, the former predominating.

Carbon Black

The Organic Nature of Carbon Black Surfaces. J. V. Hallum and H. V. Drushel. *J. Phys. Chem. 62,* 110-7 (1958) Jan.

Existence of quinone groups and aromatic hydroxyl groups on the surface of carbon black particles is substantiated. The evidence is based largely upon polarographic analyses of slurries. A mechanism for the chemical interaction of carbon blacks with elastomers is proposed.

CO Hydrogenation

Catalytic Hydrogenation of Carbon Monoxide. W. Rottig and P. Schaller (assigned to Ruhrchemie AG. and Lurgi Ges. für Wärmetechnik, m.b.H.) U.S. 2,818,418 (1957) Dec. 31.

This method of the catalytic hydrogenation of carbon monoxide uses fused or sintered iron catalysts with good yields, at an operating temperature comparable to that required by precipitated catalysts.

Carbonization

The Kinetics of Coal Carbonization. D. Fitzgerald. *The Institution of Gas Eng. Pub. 516* (1957) Nov., and *Gas J.* (British) *293,* 42-4 (1958) Jan. 1.

Kinetics of coal pyrolysis study is based on measured

production of volatiles other than tar. Results indicate that self-hydrogenation occurs to give the amounts of methane observed.

Coal Desulfurization in a Fluidized Carbonizer. J. K. Jacobs and J. D. Mirkus. *Ind. Eng. Chem. 50,* 24-6 (1958) Jan.

Determination of the possibility of producing low-sulfur char from high-sulfur (Illinois) coal. Carbonization process used reduces the char product sulfur content to about half that of the original coal. Organic sulfur is reduced less than pyritic and sulfate sulfur.

Coal Carbonization Research. A World-Wide Problem. J. D. Price and M. E. Mador. *Ind. Eng. Chem. 50,* 17-20 (1958) Jan.

Rapid depletion of high-quality coking coal reserves and location of iron and steel plants near iron ore deposits or the market for finished products have made supplying of satisfactory coke difficult. This world-wide condition has motivated research for producing satisfactory coke from locally available coals.

Carbonisation on a Base Load Works. A. G. D. Yeaman. *Gas J. 293,* 132-4 (1958) Jan. 15.

Report of the operation of the base load station at Bristol, largest in the South Western Gas Board grid network. This station is capable of manufacturing 17 million CF daily, and supplies most of the Bristol area and pumps gas into the high pressure system in Gloucestershire and the Forest of Dean.

Catalysts

Physical Structure of Silica-Alumina Catalysts. J. H. Ramser and P. B. Hill. *Ind. Eng. Chem. 50,* 117-24 (1958) Jan.

Pore size and surface area distributions of 31 fresh and sintered silica-alumina catalysts were determined from data obtained by capillary condensation. To reduce time and labor expenditures, adsorption of nitrogen was measured under reproducible conditions of near-equilibrium.

Dehydrogenation of Hydrocarbons in the Presence of a Samarium Sequioxide Catalyst. V. I. Komarewsky (assigned to Heavy Minerals Co.) U.S. 2,820,834. (1958) Jan. 21.

Samarium sesquioxide (Sm_2O_3) is claimed as a dehydrogenating catalyst for selectively converting alkanes to olefin and aromatic compounds.

Catalytic Cracking

Relationship Between the Extent of Coke Formation During Catalytic Cracking over a Silica-Alumina Spheroidal Catalyst and the Industrial Operating Conditions of the Equipment. B. V. Polyanin. *Khim i Teknol Topliva i Masel 12,* 32-8 (1957). (Russian text.)

Equations are presented relating carbon formation to reactor temperature and productivity and to catalyst circulation rate.

Assoc. Tech. Services, Inc.

Catalytic Splitting of Hydrocarbons in the Vapor Phase. F. Schaub (assigned to Ruhrchemie AG.). U.S. 2,817,625 (1957) Dec. 24.

Process for catalytic splitting of hydrocarbons in the vapor phase requires a catalyst having a granular size of, preferably, 0.5-3mm, which is passed downward through a reaction zone over a supporting surface through which the vapors can pass. The vaporized hydrocarbons are blown in from the bottom upward through the reaction zone with enough velocity so that the catalyst granules will not exert any appreciable pressure on the supporting surface.

Here's a Demonstration of the Use of a Regenerator Heat-Balance Calculation to Spot Data Errors. O. A. Wunderlich and F. E. Ivey, Jr. *Oil Gas J. 56,* 121-8 (1958) Jan. 20.

Graphical representation of the variables which control regenerator heat balance. Direct influence of the cracking catalyst on the dependent variables of CO_2/CO ratio and quantity of coke burned and indirect influence of the independent variables are demonstrated.

Coal Combustion

The Combustion of Coal. A. C. Monkhouse. *Chem. & Ind.,* 52-62, 63-4 (1958) Jan. 18.

Review of coal consumption in Great Britain, including recent work on combustion, modern developments and future projections.

Coal Gasification

Fluidisation in the Gasification of Coal Fines. *Gas J. 293,* 95 (1958) Jan. 8.

Attempt to devise a process of gasification of fines by fluidization with the following characteristics: (1) extraction of agglomerated ash; (2) high temperature of gasification; (3) heating by partial combustion in oxygen, and (4) recovery of the sensible heat of the gas produced, first by the fines in one or several fluidized stages, then by gasification in standard heat exchangers.

Carburetting Water Gas by Low Temperature Carbonisation. F. W. Lobrisch. *Gas Times 92,* 45-9 (1958) Jan.

Production of both town gas and smokeless fuel at the same cost as is possible in high temperature carbonization plant can be achieved by combining low temperature carbonization with complete gasification.

Coal Pretreatment

Process of Treating Coal. W. J. Kruppa and J. B. Rinckhoff (assigned to American Cyanamid Co.). U.S. 2,815,316 (1957) Dec. 3.

An improved method of treating swelling and caking coals by controlled oxidation to modify their coking characteristics. Suspended coal is treated in an oxidizing stream at 675°-800°F for less than one minute and then cooled.

Ethane Solvent

Separation of Gases. J. L. Jezl and A. T. Polishuk (assigned to Sun Oil Co.). U.S. 2,815,827 (1957) Dec. 10.

Alkylene (propylene) oxides are used as a scrubbing medium, at 200 psia or above, to dissolve ethane from an ethane-ethylene mixture.

Ethylene Production

Production of Olefinic Gases by Cracking of Hydrocarbons. H. Pietsch. *Erdöl u. Kohle 10,* 837-40 (1957) Dec.

Autothermic cracking of hydrocarbon represents a new procedure for light petroleum products. For ethane it is shown that with little expense on equipment, a 60% wt output of ethylene is obtained. The cracking with light petroleum as a starting material shows a similar yield. Output of olefins amounts to 20% by weight; an increase can be obtained by a second recirculation.

Ethylene: Technology Paints the Market Picture. J. W. Bradley, R. L. James and R. F. Messing. *Chem. Eng. 65,* 88, 90, 3-6 (1958) Jan. 27.

Production, uses, manufacturing capacity for ethylene and particular ethylene products.

Production of Unsaturated Hydrocarbons and Apparatus Therefor. R. R. Goins (assigned to Phillips Petroleum Co.). U.S. 2,816,941 (1957) Dec. 17.

Improved mixing and temperature control is obtained by impinging injection of fluid feed into preheated cycling gas.

Ethylene Recovery. H. E. O'Connell (assigned to Ethyl Corp.). U.S. 2,817,961 (1957) Dec. 31.

In the manufacture of ethylene by pyrolysis of ethane-propane, approximately 50-75% of the higher molecular weight materials and water in the quenched product are first removed by compression (100-200 psig) and cooling to 70°F, after which the remaining gas stream is more highly compressed, dehydrated, and the ethylene separated.

HCN Removal

Process for Purifying Hydrogen Sulphide Containing Hydrogen Cyanide. J. D. F. Marsh and W. B. S. Newling (assigned to North Thames Gas Board). U.S. 2,817,580 (1957) Dec. 24.

Method for removing hydrogen cyanide from gases containing more than 10% hydrogen sulfide, particularly the concentrates of H_2S obtained from the regenerative stage of cyclic liquid-reagent processes for the removal of H_2S from coal gas or coke-oven gas. Process comprises reacting the gaseous mixture with water vapor at a temperature between 150°-500°C in the presence of a contact catalyst and removing the resulting ammonia by washing.

Hydrogen Production

Production of Hydrogen by Continuous Thermal Decomposition of Hydrocarbon Gases. V. B. Ioffe and L. S. Zaglodin. *Khim. i Tekhnol. Topliva i Masel 12,* 52-6 (1957). (Russian text.)

A test plant producing technical hydrogen (97.2% H_2) with a capacity of 200 m^3/hr of natural gas

is described and operating results are compared with cyclic tape processes. Spheres of Al_2O_3 (or coke) are heated to 1350°C in a regenerator, then pass to a reactor, to an air lift (or steam lift with coke) and back to the regenerator. Hydrocarbon gases are decomposed in passage through the reactor. A quantity of 0.53 m^3 of natural gas (94.0% CH_4) is required per m^3 of technical hydrogen produced. This process has advantages over cyclic processes in that it produces high purity hydrogen without further purification and can use any type of hydrocarbon gas. J. W. Penney

Reformer Hydrogen: More for Chemicals. *Chem. Week 82,* 63-4, 66 (1958) Jan. 25.

Soaring U.S. catalytic-reforming capacity means 1.3 billion CF/day of byproduct hydrogen will be available by 1965. Questions to be answered: How much will the petroleum industry use and how much will it sell to outsiders? Where will the producing plants be? At the present time, answers to these questions are vague.

Hydrogenation

The Catalytic Hydrogenation of Benzene and Toluene Over Evaporated Films of Nickel and Tungsten. J. R. Anderson. *Australian J. Chem. 10,* 410-16 (1957) Nov.

In the vapor phase hydrogenation of benzene and toluene over evaporated films of nickel and tungsten, there is some poisoning of the catalyst surface by adsorbed hydrocarbon residues, resulting in falling rate of hydrogenation. Activation energies and frequency factors are obtained from initial rates. The rate and extent of poisoning increase with temperature. During the hydrogenation of benzene over nickel, cyclohexene sometimes is formed. Hydrogenation of cyclohexene over nickel is very rapid but strongly inhibited by benzene. On a benzene poisoned nickel surface, cyclohexene disproportionates to benzene and cyclohexane.

Catalytic Hydrogenation of Ethylene over Evaporated Nickel. J. G. Foss and H. Eyring. *J. Phys. Chem. 62,* 103-5 (1958) Jan.

Hydrogenation of ethylene over evaporated nickel surfaces was found to be zero in ethylene and first order in hydrogen for pressures of 0.03-300 mm with an activation energy of 8 kcal.

Nitrogen Oxide Removal

Reduction of Oxides of Nitrogen in Vent Gases. H. R. L. Streight. *Can. J. Chem. Eng. 36,* 3-11 (1958) Feb.

Objectionable brownish-red color of effluent gases can be eliminated by use of ammonia-caustic liquor instead of dilute caustic scrubbing alkaline solution. Finely dispersed ammonium salts can be removed in a Venturi scrubber. Newer method is more economical.

Plant Wastes

The Treatment of Effluents from Carbonising Plants. R. B. Niezgoda. *Gas J. 293,* 183-7 (1958) Jan. 22.

Plant effluent treatment for removal of phenols is emphasized.

Producer Gas

Method of Operating Gas or Shale Oil Producer-Retorts. A. L. Galusha. U.S. 2,816,823 (1957) Dec. 17.

A producer-retort for the continuous production of high pressure hot gas (and shale oil) from solid fuels (or oil shale) is claimed. The blast pressure is maintained by the retention of sufficient spent-ash seal during gravity withdrawal from the conical ash receiver. With shale operations, an eccentric rotary grate may be used, and with coal an ash-cooling water spray is used in the ash receptacle.

Propylene

Propylene: By-Product with Bright Future. *Chem. Week 82,* 29-30 (1958) Feb. 8.

Successful applications of polypropylene plastics, being pioneered by Hercules, will lead to great demand for propylene, now available at most refineries at $0.05-0.07/lb.

Refinery Operations

Refiners Had to "Adjust" in '57. *Oil Gas J. 56,* 170-3 (1958) Jan. 27.

Lower realizations and conditions in the oil industry over which refiners had little control necessitated adjustments in amount and quality of products during 1957. Suez crisis played a major role, by relaxing the tight crude oil markets. Research octane of premium-grade gasoline rose more than

one full number. In projecting the progression of octanes this year, two bases must be considered: the potential for boosting octane quality and the incentive to use available processes.

Reforming

Conversion of Methane at High Pressure. Ya. R. Katsobasnveeili and A. R. Brun-Tsekhovoi. *Khim. i Tekhnol. Topliva i Masel 11,* 53-8 (1957). Russian text.)

Calculated equilibrium gas compositions are given for the conversion of methane with steam, in the temperature range 527-827°C, for pressures up to 30 atm and for steam/gas ratios of 2-8. Use of high-pressure conversion with large steam/gas ratios to reduce input requirements is recommended. At 30 atm and a steam/gas ratio of 8, the input is only 60% of that required for the process at atm and with a steam/gas ratio of 2. Existing equipment is not satisfactory. A fluid catalyst bed is suggested.

J. W. Penney

Retort Gas Peaks

Base Load Operation at Pontypool. K. R. Edwards. *Gas J.* (British) *293,* 33-7 (1958) Jan. 1.

Operation of a large plant in the South Wales gas grid, making base-load gas from local coal in steamed retorts. Problems of winter peak loads and use of excess coal gas for retort heating in summer are reviewed.

Rubber Intermediates

Producing Butadiene from Butane. J. W. Delaplaine (assigned to Catalytic Construction Co.). U.S. 2,816,943 (1957) Dec. 17.

Butadiene is separated from butane and other gases by a double solvent extraction procedure. During the first stage, paraffin oil is used on a mixture of C_4 hydrocarbons to yield crude butadiene overhead; the second stage extracts this overhead with a C_3 to C_5 ketone agent to yield a bottoms fraction of dissolved butadiene and a recycle stock of non-butadienes.

Petrochemical Monomers for the Synthetic Rubber Industry. P. W. Sherwood. Part 1. *World Petrol. 28,* 78-81, 146-8 (1957) Oct.; Part 2. *Ibid.* 96-8 Nov.; Part 3. *Ibid., 29,* 47-9, 52, 4 (1958) Jan.

Economic and marketing aspects for the synthetic rubber industry are discussed. The raw-materials position for each of these intermediates is given. Subsequent discussions present the manufacturing techniques by which petroleum hydrocarbons are converted to the five principal building blocks employed in the production of synthetic rubber: isobutylene, butadiene, styrene, acrylonitrile and chloroprene.

Sulfur from H_2S

Conversion of Hydrogen Sulfide to Sulfur with Quinones. R. A. Patton (assigned to Texas Gulf Sulfur Co.) U.S. 2,819,950 (1958) Jan. 14.

Hydrogen sulfide is converted to sulfur by reaction with a quinone (of 0.2 oxidation potential) in a recirculating fluid acid medium. After free sulfur is removed from the resulting hydroquinone solution, the medium is reoxidized to quinone in a separate zone.

Synthesis Gas

Method of Shutting Down the Gas Generator. D. B. Eastman and L. S. Slater, Jr. (assigned to Texas Co.). U.S. 2,818,326 (1957) Dec. 31.

Method for production of high temperature gases, such as carbon monoxide, hydrogen or synthesis gas, wherein a carbonaceous fuel is subjected to reaction with an oxidizing agent comprising free oxygen at an elevated temperature and at superatmospheric pressure and wherein the hot resulting products of reaction are cooled by direct contact with water in an amount in excess of that which may be vaporized in cooling the gas stream.

Underground Gasification

Underground Gasification in Russia. *Chem. & Ind.* 36-7 (1958) Jan. 11; *Chem. & Process Eng. 39,* 39-40 (1958) Feb.

Brief comments by members of the National Coal Board Mission to Russia on underground gasification of coal. Mission toured Russia between November 17-December 3, visiting the Tula (17-year old) and Schatzk (nearly completed) stations; the Stalino Institute where designs for plants at Yuzhno-Abinsk, Stalinsk and Kholmogory (Siberia) were explained; the Lisichansk station and the Moscow Research Institute where field and laboratory research studies on directed drilling, aerodynamics and kinetics, uses of oxygen were outlined. A return visit to Britain of Russian technologists is planned for March.

8. GAS DISTRIBUTION

Distribution Network

A Computer Program Can Help Solve Gas Network Problems. R. L. McIntire. *Oil Gas J. 56,* 106 (1958) Feb. 3.

A satisfactory computer program for a gas network basically will consist of the given data available from the design engineer, the resistance to flow of each pipe in a form usable to the flow equation, an indication to the machine of how the pipelines are interconnected, flow distribution data, solution tolerance and the pressure at one node in the system.

Joint Repairs

Repair Sealing Bell and Spigot Joints with Rubber Base Sealants. *Gas 34,* 59-61 (1958) Jan.

An air-driven machine has been developed which operates over 600-ft lengths of main in locating, cleaning and sealing each joint with a specially designed rubber polymer compound.

Main Relocation

Relocating 16-in. Gas Main to Accommodate Big Storm Sewer Creates Special Problems. R. A. Schoger. *Am. Gas J. 185,* 12-3 (1958) Feb.

Planning, construction, public safety, tie-in, interruptible cutoff, purging of 4800-ft, 16-in. main.

Meters

"Non-Stop" Meter Shop. A. B. McCurdy. *Amer. Gas J. 185,* 20-6 (1958) Jan.

Time-saving devices, effectively placed, have given the $1.3 million Dallas Division of the Lone Star Gas Company a virtual "non-stop" meter shop.

Does Your Meter Need Proving? T-Y. Yang. *Petrol. Refiner 37,* 167-9 (1958) Jan.

A method, developed by the Chinese Petroleum Corp., will test positive displacement meters for accuracy and calibrate tank cars at the same time. A volumetric proving system may be used on both.

Modernized System

Saving by Modernizing. C. H. Vivian. *Compressed Air 63,* 12-8 (1958) Jan.

During 1956, the Southern California Gas Company spent $20,527,000 on additions to and replacements of the distribution pipeline system; more than $17 million for expanding transmission and storage facilities and over $4 million for land, buildings and other general plant purposes.

Weather Data

Local Climatic Weather Data. W. F. Holliday. *Heating, Piping & Air Conditioning 30,* 201-06 (1958) Jan.

In 1957, the research committee of the Southern California chapter of ASHAE appointed a Task Force on Outside Design Temperatures to develop and publish recommended design temperatures for as many local communities as possible. Methods and a summary of the results for about 450 communities in southern California, Arizona and Nevada are presented.

Weather vs. Demand

Applied Meteorology at PG&E. F. J. Parsons, Jr. *Gas Age 121,* 32-4 (1958) Feb. 6.

Over 180 special studies have been conducted by the meteorologists at Pacific Gas & Electric Co. in response to requests from agencies within the company, thus bearing out the value of the service.

A Weatherwise Company. C. P. Smith. *Gas Age 121,* 32-3 (1958) Feb. 6.

Pacific Gas & Electric Co. employs four meteorologists to deal with such problems as routine forecasting, monitoring of potentially dangerous conditions, consulting service and cloud seeding projects.

Meteorology as a Factor in Gas-Load Dispatching. J. R. Murray and D. W. Trettel. *Gas Age 121,* 34-7 (1958) Feb. 6.

Profitable operation is a prime responsibility of the gas dispatcher whose decision is based, to a large extent, on weather conditions. The tailored forecast is the key to such decisions.

Need for Degree-Day Forecasting for the Petroleum Industry. W. J. Sweeney. *Gas Age 121,* 37-40 (1958) Feb. 6.

A major planning problem in recent years has been heating oil or middle distillates. In the future, with

larger diesel and jet fuel demands, as well as increasing heating oil demand, the problem of planning heating oil needs will become more acute.

Using "Climatic Odds" to Estimate Fuel Requirements. L. W. Crow. *Gas Age 121,* 40-1, 58 (1958) Feb. 6.

Data from records relating degree-days to any type of fuel consumption will yield a use-per-degree-day factor which can be used with climatic tables to obtain the climatic odds of fuel requirements for any future period desired.

9. GAS FUEL UTILIZATION AND APPLIANCES

Air Conditioning

4 Steps to Air Conditioning Design. F. W. Hutchinson. *Heating, Piping, Air Conditioning 30,* Part 1. 176-8 (1958) Jan.; Part 2. *Ibid.,* 92-3 (1958) Feb.

Of four major steps in air-conditioning system design, the first—defining the problem—is most important. Outside help from climatologist, physiologist and architect may be required. In Part 2, evaluation of the thermal load, designing for extreme conditions and for control of partial loads, utilizing empirical engineering methods, are discussed.

Cooling Load from Pretabulated Impedances. H. Buchberg. *Heating, Piping & Air Conditioning 30,* 115-20 (1958) Feb.

Computation of cooling loads using pretabulated complex impedance characteristics of typical wall construction. The solution of a thermal network representing the heat transfer paths in a one-room frame dwelling based on sinusoidal steady state inputs is compared to a more exact solution obtained with a d-c network computer.

Greenhouse Climate Control. R. S. Ash. *Refrigerating Eng. 66,* 41-6 (1958) Feb.

Simple formula for sizing evaporative cooling systems for greenhouses to improve and increase crop production during summer months. Washed air or evaporative cooling can be economically justified for eight basic reasons.

Air-Fuel Ratios

Tables Save Time in Excess Air Calculations. E. W. Jerger. *Air Conditioning, Heating, Ventilating 55,* 73-5 (1958) Jan.

Effect of excess air variation on combustion characteristics of fuel oil, natural gas, propane, butane and bituminous coal are tabulated to show percent of carbon dioxide in dry products of combustion and useful forms of air-fuel ratio.

Air Pollution

Control of Air-Borne Wastes. M. L. Branin. *Coal Utilization 12,* 18-21 (1958) Jan.

Brief background on early attempts to control air pollution, mechanical methods used to effect control, leading up to the development of the electrostatic precipitator.

Karachi Becoming a Smokeless City. *Progress 2,* 3 (1958) Jan.

Use of natural gas from Pakistan Petroleum's Sui field by major industries is transforming Karachi into a smokeless city. Gas is made available through a 347-mile pipeline.

Appliances, 1958

$5 Billion Appliance Outlay. C. V. Coons. *Gas Age 121,* 39-40 (1958) Jan. 9; *Gas 34,* 65 (1958) Feb.; *A.G.A. Monthly 40,* 11 (1958) Jan.; *LP-Gas 18,* 48, 101-2 (1958) Feb.

More than one million new homes with an average prospective outlay of $1850 for appliances provide bright forecast for 1958.

Appliance Improvement

Kitchen Demands: Speed, Economy, Custom-Built Look. B. Hall. *Gas 34,* 49-52 (1958) Jan.

Today's homemakers unanimously approve the current trends in the design of gas appliances. Most wanted features: automatic operation, speed, convenience, beauty, capacity, ease of cleaning.

Spectacular Changes Due in Domestic Appliances. *Gas 34,* 44-8 (1958) Jan.

Increased speed, more automatic operation, reduced size or required space for a given job of Btu input, improved quality and greater safety describe the general trends in all gas appliances. The gas

industry, both utilities and manufacturers, are taking an increasingly aggressive attitude.

Test of a Lifetime. E. C. Todd. *Gas World 147,* 217-9 (1958) Jan. 25.

Accelerated life tests are invaluable tools in forecasting design weaknesses in new appliances in the laboratory. The result of work carried out to correlate laboratory life test results with the condition of appliances is presented.

Baking Equipment

The Gas Bakery. *Ind. Gas 18,* 20-2 (1958) Jan.

Latest equipment for the small family baker and pie manufacturer was displayed at the Northern Gas Board Exhibition. Included were a full complement of ovens, ranges, boiling tables, water heating equipment and overhead radiant heaters.

Burners

Gas Burner Having Ribbed Cap Member Provided with Peripherally Drilled Ports. I. V. Brumbaugh. U.S. 2,817,397 (1957) Dec. 24.

Universal cooking top burner, adaptable for use with all types of gases, which is not subjected to flashback or to the depositing of soot, is claimed. Important features are a cluster of center ports, drilled on a common diameter, placed as close together as possible, and a one-piece burner cap formed with a plurality of ribs extending downward and with a plurality of peripheral drilled ports.

Control Means for Gaseous Fuel Burners. R. T. Huyck (assigned to Roberts-Gordon Appliance Corp.). U.S. 2,815,768 (1957) Dec. 10.

Opening of the gas valve without first opening the air supply is prevented by a special link and latched stop. This invention is applicable to valves which control the admission of gaseous fuel and air to a burner.

Gas Burners. F. V. Wedlick and F. A. Tyrone (assigned to Killam Gas Burner Co.). U.S. 2,818,-112 (1957) Dec. 31.

Provision of a burner which will maintain a pilot flame about the peripheral surface of a stream of combustion gases flowing to a main flame, regardless of the velocity of flow so that the main flame will be self-igniting in case of blowouts.

Gas Fired Radiant Tube Burner. M. J. Parker and A. J. Turpin (assigned to Hauck Manufacturing Co.) U.S. 2,820,447 (1958) Jan. 21.

Tubular burner is claimed for immersion, convective or radiant heating, in which flame length control is maintained by a sliding sleeve which apportions primary and secondary air.

Clothes Dryers

Gas Dryers Gain on Electric. *Butane-Propane News 20,* 58 (1958) Feb.; *Gas Age 121,* 21, 56 (1958) Feb. 6.

Domestic gas clothes dryers gained on electric dryers in sales by 6.6%, and expectations are that this gain will at least be maintained in 1958. Manufacturers expect that 5,370,000 home appliance units will be sold this year.

Clothes Drier. E. Soffer (assigned to White Sewing Machine Corp.) U.S. 2,820,623 (1958) an. 21.

Domestic, drum type clothes dryer has been developed, utilizing gas heat for rapid rotation drying and milder electric heat for quiescent drying of delicate fabrics with combined thermostatic controls.

Combustion Research

Report of Research and Technologic Work on Explosives, Explosions, and Flames Fiscal Years 1953 and 1954. R. F. Brinkley and R. W. Van Dolah. *Bureau of Mines Inf. Circ.* 7804 (1957) Nov.

This report, sixteenth of a series of continuing research programs, reviews fundamental studies on detonation, explosibility of ammonium nitrate firedamp ignition, flammability of hydrocarbon fuels, coal mine dust explosions, gas combustion and burner studies and carbon-oxygen reactions. The text summarizes the research, studies and tests conducted during fiscal years 1953 and 1954.

An Isotopic Tracer Study of Carbon Formation in Hydrocarbon Flames. R. E. Ferguson. *Combustion & Flame 1,* 431-7 (1957) Dec.

Isotopic analyses of gaseous products to show that carbon does not arise preferentially from a two-carbon piece of the fuel molecule.

Studies on the Oxidation of Hydrocarbons under Extremely Clean Experimental Conditions. Z. G. Szabo and D. Gal. *Combustion & Flame 1,* 404-19 (1957) Dec.

Investigations were carried out in an all-glass apparatus to minimize impurities. Ethane, ethylene and acetylene were chosen as model substances; the catalytic effects of water, iodine, methylamine and nitric oxide were examined.

The Point of Attack in the Oxidation of Hydrocarbons. C. F. Cullis. *Petrol. 21,* 49-52, 8 (1958) Feb.

Determination of the initial position of oxygen attack in the combustion of hydrocarbons is made on two considerations—the influence of molecular structure on the ease of gaseous oxidation, and detection by means of isotopically labeled fuels. Review of problems relevant to the problem and examination of the behavior of paraffin hydrocarbons on the basis of the two approaches.

Calculation of Theoretical Flame Temperatures in Furnaces. J. W. Myers, S. A. Goldberg and R. W. Smith, Jr. *Trans. ASME 80,* 202-16 (1958) Jan.

Graphical interpretation of thermodynamic data for use in determining adiabatic flame temperatures for combustion processes at atmospheric pressure. Data are applicable for coal, coke and liquid and gaseous hydrocarbon fuels when burned with air at values of excess air ranging from 0-100%.

A Theory of Flame Propagation Limits Due to Heat Loss. E. Mayer. *Combustion & Flame 1,* 438-52 (1957) Dec.

Flame propagation limit criteria are deduced for two special cases. Illustrative numerical applications are made to hydrocarbon—air data. Theoretical results for both cases, quenching and composition, are in satisfactory agreement with observed data.

Mechanisms for the Formation of Ions in Flame. H. F. Calcote. *Combustion & Flame 1,* 385-403 (1957) Dec.

Present-day understanding of the mechanisms of ion formation in flames is summarized, including a literature review and some new proposals on cumulative and chemi-ionization. Most critical problem in the chemi-ionization process is the actual identification of the ion.

Interpretation of the Sample Taken by a Probe in a Laminar Concentration Gradient. A. A. Westenberg, S. D. Raezer and R. M. Fristrom. *Combustion & Flame 1,* 467-78 (1957) Dec.

Theoretical study of laminar flame front structure in which the situation is approximated by a point sink located in a two-dimensional flow field containing a concentration gradient of a binary mixture. Appropriate diffusion equation is solved by relaxation technique. Results indicate that the sample entering the sink has a composition only very slightly different from that existing at the same point in the unperturbed (no sink) case.

Determination of Burning Velocity of Pentaborane—Oxygen—Nitrogen Mixtures. W. G. Berl, E. L. Gayhart, E. Maier, H. L. Olsen and W. T. Renich. *Combustion & Flame 1,* 420-30 (1957) Dec.

Pentaborane has been selected as a representative boron hydride in order to obtain burning velocity measurements over a wide range of fuel-air mixtures. Pentaborane-air mixtures reach a maximum velocity value slightly on the rich side of stoichiometric. Influence of oxygen concentration on burning velocity is reported. Pentaborane flames show pronounced cellular structure of the flame front at all mixture ratios.

Customer Service

Company Service Policy Determines Dispatch Procedure. A. Tarapchak. *Am. Gas J. 185,* 17-22 (1958) Feb.

Approximately 370 field personnel, excluding supervisors, carry out the Washington Gas Light Company's customer service policy. Predominantly a free service company, this concern has about 375,000 meters, of which some 200,000 include house heating. Except where repair parts are required, all service on checking, adjusting, lighting and cleaning gas appliances is provided at no charge to the customer.

Heating

Industry Had Just a Fair Year. *Fueloil and Oil Heat 17,* 43-50 (1958) Jan.

Oilburner installations, gas burner sales and coal stoker sales all declined during 1957. Total sales

of automatic heating (as of October) indicated a drop of 11%. Sold were 609,905 oilburners, 992,530 gas burners and 12,413 coal stokers.

Small Pipes Improve Central Heating Efficiency. *Fuel Efficiency 5,* 597-8 (1957) Dec.

Discussion of Small-Pipe Central Heating system developed by the British Coal Utilization Research Association to bring the advantages of central heating within the reach of a larger section of the community.

Outdoor-Indoor Systems Offer Temperature Control for Multiple Tenant Housing. F. Lowe, Jr. *Gas Heat and Comfort Cooling 9,* 31-3 (1958) Jan.

Fully automatic and tamperproof control is important consideration in heating of low rental multiple tenant apartment buildings.

Boilers, Compressors Go "Top Side" in Newest Newspaper Plant. *Heating, Piping & Air Conditioning 30,* 84-6 (1958) Feb.

Feature of the new Chicago Sun-Times building is the heating, air conditioning plant located on upper floors. System provides year 'round comfort through perimeter, interior zone setup.

Wall Furnace. L. B. Cayot (assigned to Commonwealth Co.). U.S. 2,818,059 (1957) Dec. 31.

Hot air type furnace which employs forced draft circulation. Effective isolation of the forced air circulation from the combustion chamber and combustion products flue permits the use of any desired air velocity and blower intake suction without influencing the character of the combustion or the composition of the combustion products.

Heat Treating

Rod Heating Machine. F. O. Hess (assigned to Selas Corp. of America) U.S. 2,820,621 (1958) Jan. 21.

Short metal bars or other shapes are heated uniformly for further forging by charging them into shallow containers mounted on a wheel rim which rotates through an arcuate furnace space heated by radiant burners.

Gas-Fired Continuous Plant Speeds Frit Production. *Ceramics 9,* 20-2 (1958) Jan.

A gas-fired continuous frit melting plant, designed and installed by the Stoke-on-Trent industrial gas department of the West Midlands Gas Board in cooperation with the glass maker, has improved the quality of the product, stepped up the process and reduced costs.

Use of Gas in a Large Engineering Works. *Gas World 147,* (Ind. and Commercial Gas Supplement) 8-9 (1958) Jan. 18.

Use of gas in melting furnace, core and mold stoves, plate furnaces and in heat treating furnaces in a large foundry is described and illustrated.

10 Advantages of Rapid Heating of Steel. Q. A. Bloom. *Ind. Gas 36,* 4-8 (1958) Jan.

Rapid heating of steel by gas has become a versatile tool for the steel maker; applicable in processes of wide temperature range and numerous shapes.

Forge Furnace. C. O. Knierim (assigned to Gas Machinery Co.). U.S. 2,817,507 (1957) Dec. 24.

Furnace for heating elongated billets to forging temperatures in an inert or non-oxidizing atmosphere.

Scale Free Furnace Heating with Economical Fuel Consumption. *Fuel Efficiency 5,* 594-6 (1957) Dec.

New thermal system can be applied to both existing and new furnaces for forging, rolling, extrusion or any heating process. Main claims: elimination of scale with improved quality production, reduced furnace maintenance and substantial fuel savings.

Industrial Drying

How New Gas Dryer Speeded Production of Starch. A. Q. Smith. *Ind. Gas 36,* 2-3 (1958) Jan.

Gas-fired starch flash dryer aids American Maize-Products Co. in their annual production of 90 million pounds of starch, 2,100,000 bu. of corn.

Gas-Fired Drying Ovens for High Speed Finishing. *Ind. Gas 243,* (1957) Dec.

Advent of synthetic base and coating materials has added incentive to the development of precision equipment for drying and curing processes. Gas-fired equipment is no exception to this rule.

Baking Ovens for Paint Finishing Systems. A. S. Dawe and J. A. Kinn. *Ind. Heating 25,* 127-8, 30, 2, 4, 42 (1958) Jan.

Optimum baking oven design requires knowledge

of type of finish to be cured, time-temperature requirements, conveyor speed, feet of conveyor travel in oven, layout and space considerations.

How Newark Stove Co. Solved Enameling Furnace Problem. *Ind. Gas 36,* 8-9 (1958) Jan.

Installation of Inconel radiant tubes have solved a difficult and expensive maintenance problem. New tubes have four times the life of cast alloys formerly used.

Radiant Burner

Gas Fueled Radiant Heater. D. A. Jacobson (assigned to Granco, Inc.). U.S. Re. 24,405 (1957) Dec. 17.

This radiant burner is comprised of a ceramic target unit and a metal manifold clamped along one edge for the distribution of fuel. The gas is issued from a narrow slot in the manifold and is ignited upon a curved refractory surface molded into a multiplicity of vertical grooves which provide a broad combustion and radiating surface.

Ranges

Research on New Designs for Range Top Burners, Pilots and Valves. American Gas Association Laboratories. Research Bulletin 76. Cleveland: The Association Laboratories, 1957.

New burners and ignition systems were developed for the gas industry to reduce the bulk and improve the performance of range top burners having single injection tubes. Among the burners described by the report is the flame retention burner. This unit, which has a maximum diameter of 1¼ in., was designed to operate satisfactorily on all typical fuel gases with heat input spans ranging from 500 Btu/hr turndown up to as much as 23,000 Btu/hr on natural gas. The ignition systems developed for these burners contain an ignition port plus carryover slot on the burner and an individual pilot burner rated at 50 Btu/hr.

Refrigeration

Permeability of Plastics Films to Refrigerant 12 and Nitrogen. H. M. Parmelee. *Refrigerating Eng. 66,* 35-40 (1958) Feb.

If the wall thickness of a refrigerator were reduced by one-half, the space now occupied by a 10 cu ft refrigerator could provide for one of approximately 14 cu ft interior volume. This can be accomplished with more efficient thermal insulation. One approach toward the solution of the problem is based on the use of plastics enclosures for heavy gases.

Refrigeration Manufacture

Whirlpool Purchases Servel Refrigerator Facilities. *Gas Industries Equip. Appl. News 2,* 1 (1958) Feb.

Whirlpool Corp., St. Joseph, Mich., has purchased all facilities, including patents, property and equipment relating to the Servel gas refrigerator and ice maker. First production models of gas refrigerators under the RCA-Whirlpool label are expected to be on the market about April 1. Improvement in features, styling and performance is the basis of a $450,000 research program on this appliance.

Service Steam

Design Data for Service Steam. F. M. Reiter. *Air Conditioning, Heating and Ventilating 55,* 92-100 (1958) Feb.

Service steam, widely used in commercial and industrial buildings, is produced for power generation, oil refining and manufacture of chemicals, to name a few. It has numerous applications to commercial and industrial processes. Informative tables condense necessary design data.

Turbine Power

Cheaper Power with Gas Turbines. C. R. Apitz. *Oil Gas J. 56,* 88-90, 2 (1958) Feb. 3.

Versatility of gas turbines has made them beneficial to the refining and petrochemical fields. Uses include drivers for pumps, compressors and generators. The turbine may also be used as a hot-gas generator for catalyst regeneration. Application techniques, data on operational cost and performance predictions for these machines are covered.

Water Heating Rental

Hot Water for Rent. W. J. Malchiodi and R. N. Spear. *Butane-Propane News 20,* 29-32 (1958) Feb.

How the Protane Corp. set about the development of an effective program of renting commercial water heaters in the nine-state area it serves.

10. EQUIPMENT AND INSTRUMENTATION

Automatic Pilot Plant

Automatic Pilot Plant Puts Speed in Testing. *Bus. Week No. 1484,* (1958) Feb. 8; *Oil Gas J. 56,* 78-9 (1958) Feb. 10; *Chem. Eng. News 36,* 53 (1958) Feb. 17.

Extraordinary pilot plant, called Micro-Plant, scheduled for completion by late spring, will share office space with a section manager of the Process Research Div. of Esso Research. New type of plant is modular in design, so that parts are interchangeable, and completely automatic under the guidance of a digital computer and quick-acting analytical instruments that record chemical changes in the pilot process.

Chemical Cleaning

How to Prepare for Chemical Cleaning. I. Bielek. *Petrol. Refiner 37,* 155-8 (1958) Jan.

Planning, scheduling, discussion of equipment to be cleaned and arranging for piping to cleaning equipment can insure a better, safer cleaning job with downtime minimized.

Computers

Computers in the Process Industries. T. J. Williams, R. C. Johnson and A. Rose. *Instruments and Automation 31,* 90-4 (1958) Jan.

Summary of computer applications to date, including difficulties, is the best way to evaluate present effectiveness and project future role of computers in the process industries.

Trend Toward Increased Use of Computers Will Be Pronounced in 1958. J. F. Ebdon. *Gas 34,* 99-101, 106 (1958) Jan.

Data processing systems in the general accounting-bookkeeping-billing operations constitute largest gas industry application of computers. During 1958, this will continue to be true. However, engineers have expanded their use of computers (61.5% in the past three years) for design, gas measurement and technical statistical studies. Article includes tabulation showing some of the reporting gas companies that are using computers.

Condenser Design

Condensation of Vapours from Gas-Vapour Mixtures. An Approximate Method of Design. B. Hulden. *Chem. Eng. Sci. 7,* 60-5 (1057) No. 1/2.

Graphical application of Colburn-Hougen analysis to solution of condenser design problems. Method has the advantage of giving a clear overall view of the design procedure in analogy to the enthalpy driving force methods.

Contactors

Pall Rings—New Type of Tower Packing. J. S. Eckert, E. H. Foote and R. L. Huntington. *Chem. Eng. Progress 54,* 70-5 (1958) Jan.

Results of comparative tower packing performance tests of carbon steel Pall rings and Raschig rings of the same size indicate improved mass transfer coefficients and reduced pressure drop for Pall rings. This is attributed to increased utilization of the inside surface of the ring, decreased tendency to channel and increased permeability.

Fire Protection

Guard Against Detonation Hazards. E. L. Ghormley. *Petrol. Refiner 37,* 185-90 (1958) Jan.

Any plant handling flammable gases may be vulnerable to a detonation type of explosion. This article summarizes when detonation can occur and what preventive measures can be taken.

How to Fight Refinery Fires. J. L. Risinger. *Petrol. Refiner 36,* 204-6-8-10-12-14-16 (1957) Dec.

When a refinery fire occurs, oil and its products should be divided on the basis of (1) vapor-air mixture of burning product: (2) whether the oil is on the loose, or (3) at rest in a pit, pool, tank or other container. Points to remember for the handling of each case are discussed.

Extinction of Fires in Liquids by Cooling with Water Sprays. D. J. Rasbash and Z. W. Rogowski. *Combustion & Flame 1,* 453-66 (1957) Dec.

Extinctions which occurred when liquids burning in open vessels were cooled by water sprays projected downwards on to the liquid surface have been correlated in one equation which relates the extinction time with the spray and fire properties.

Heat Transfer Equipment

High Efficiency in High-Temperature Heating. *Chem. & Process Eng. 39,* 5-6 (1958) Jan.

New gas-fired high-temperature heating unit (500,000 cal/hr) uses constant boiling mixture of 73.5% diphenyl oxide and 26.5% diphenyl as heat transfer medium. Highly efficient, it is capable of automatic control to within 1°-2°C of any predetermined temperature up to a maximum of 370°C.

How to Design Finned Tube Shell and Tube Heat Exchangers. Design of Finned Tube Partial Condensers. *Petrol. Eng. 30,* C-37-8, 40-2, 4-5 (1958) Feb.

Rigorous and approximate methods. Design approach for saturated and superheated feeds.

Shell-Side Characteristics of Shell-and-Tube Heat Exchangers. T. Tinker. *Trans. ASME 80,* 36-52 (1958) Jan.

Development of a simplified rating system for commercial shell-and-tube heat exchangers, based on the fluid-flow pattern concepts developed by the author. Recommended heat transfer and friction characteristics for practical design purposes are presented.

Instrumentation Costs

Three Ways to Estimate Instrumentation Costs of Process Plants. J. W. Bernard. *Control Eng. 5,* 88-91 (1958) Feb.

Three cost estimating methods of varying accuracy are presented with suggested figures to use, and a detailed instrumentation cost estimate—for a distillation column—based on the most accurate method.

Orifice Meters

Mercury Vs Bellows-Type Orifice Meters. E. Niederer, Jr. *Gas Age 121,* 15-7, 55-6 (1958) Feb. 6.

Tests conducted with three meters indicated that results of temperature stability and inherent speed of response suggest that the bellows meter is continuously more accurate than the mercury meter. All three are sufficiently accurate for use in a commercial utility system. Possibility of improving basic flow measurement accuracy exists.

Straightening Vanes for Flow Measurement. R. E. Sprenkle and N. S. Courtright. *Mech. Eng. 80,* 71-3 (1958) Feb.

Designed to produce uniformly turbulent flow at an orifice or flow nozzle, a new type of flow straightener, using separated plates, makes possible a new accuracy of flow measurement regardless of the geometry of the piping system.

Piping

Designing, Fabricating Pressure Piping. J. J. Murphy, C. R. Soderberg, H. S. Blumberg and D. B. Rossheim. Part 1. *Heating, Piping, Air Conditioning 30,* 160-4 (1958) Jan.; Part 2. *Ibid.,* 87-91 (1958) Feb.

Review of current pressure equipment practices and analysis of the interrelation of materials, design, fabrication and inspection with safety, economics and service as objectives. Considerations presented lead to a proposal for a new broad "balanced" approach. In Part 2, a comprehensive tabular breakdown categorizes information on four construction classes according to design, materials, fabrication and inspection requirements.

Design Your Piping to Cut Maintenance Costs. W. A. Weiss. *Petrol. Refiner 37,* 141-6 (1958) Jan.

A plant's piping system is designed only once, but maintenance is continuous. More thought to maintenance during design results in fewer and shorter costly shutdowns.

Pump

High Pressure Piston Pump for Liquefied Gases. B. Petzold (assigned to Adolf Messer G.m.b.H.). U.S. 2,818,029 (1957) Dec. 31.

Efficient action is achieved by provision of a hollow piston which is separate from the piston rod. Both the piston and piston rod are capable of some relative movement in the radial sense and a short movement in the axial direction as compared with the length of the piston, the piston being guided by the cylinder, the rod by the casing.

Shaker Bomb

Shaker Bomb—New Laboratory Tool for Studying Thermal Processes. J. W. Payne, C. W. Streed and E. R. Kent. *Ind. Eng. Chem. 50,* 47-52 (1958) Jan.

Shaker bomb is a valuable new tool for study of

high temperature, high pressure reactions where good agitation, rapid heating and rapid cooling are desired. The relationship between the processing severity and the product distribution obtained is reproducible and generally correlates well with commercial experience.

Steam Power

Portland Station Features Combination of Latest Designs. J. G. Miller and R. H. Kreisinger. *Combustion 29,* 34-41 (1958) Jan.

Three features, a subcritical-pressure steam generator, a close-coupled cross-compound axial-flow exhaust turbine and side-entry condenser and a direct energy-balance combustion control mark the Portland Station of the Metropolitan Edison Co. as a significant milestone in steam cycle development.

Stream Velocities

A Rhodium-Plated Kata Thermometer for Measuring True Air Velocity. W. Koch and D. Kaplan. *J. Sci. Instruments 35,* 8-11 (1958) Jan.

Rhodium-plated kata thermometers were tested in non-turbulent air streams, and formulas for estimating true air velocities from cooling rates were developed. Cooling of the instruments is not directly related to the square root of air speed at low velocities.

Systems Engineering

What and Where Is the Systems Engineering Market? A. C. Brodie. *Instruments and Automation 31,* 80-3 (1958) Jan.

Presentation of the efforts made to provide systems engineering for the process and industrial control field, complete with table of surveys conducted. Its objective is to focus attention of those people with a servo background on the present selective needs of process control, which on the surface appears to offer unlimited application.

Turbine Prime Movers

Gas Turbines as Prime Movers in the Chemical Industry. *Chem. & Process Eng. 39,* 7-9 (1958) Jan.

Discussion of gas turbines for driving alternators, compressors and pumps in a chemical works. Includes economic considerations, heat rate and practical uses.

Valve Operators

Electric Control-Valve Operators. G. F. Brockett. *Instruments and Automation 31,* 111-6 (1958) Jan.

A thorough summary of available and experimental electric-powered control-valve operators, complete with an investigation of the inherent problems, a description of various solutions, an analysis of economic factors and an outline of improvements anticipated in future developments.

11. MATERIALS OF CONSTRUCTION, AND CORROSION

Cathodic Protection

Invention Quickly Finds Defective Insulators. T. Snedden. *A.G.A. Monthly 40,* 34-7 (1958) Jan.; *Gas Age 121,* 11-5, 52 (1958) Jan. 23.

Development of a testing system, using the principle of induction of a known impressed A.C. voltage across an insulator (the insulator being part of a cathodically protected system), that will show the actual condition or effectiveness of the insulating fitting in place regardless of conditions existing on adjacent services.

Cathodic Protection Helps to Lengthen Life of Pipelines. H. J. Escreet. *Gas Times 92,* 37-9 (1958) Jan.

Unless it is combined with a good coating, cathodic protection is uneconomic. If the coating used costs £1000 per mile of pipeline, installation of cathodic protection would cost £500 with a running cost of 5 pounds per annum. Cathodic protection applied to bare pipe would cost twenty times as much to install and maintain.

Electrochemical Deterioration of Graphite and High-Silicon Iron Anodes in Sodium Chloride Electrolytes. S. Tudor, W. L. Miller, A. Ticker and H. S. Preiser. *Corrosion 14,* 93t-9 (1958) Feb.

Description of laboratory methods for correlating electrochemical deterioration rates of various graphite and high-silicon iron anodes with current drain in NaCl electrolytes of 50, 1000 and 5000 ohm-centimeter specific resistivities. Data on high-silicon iron anodes in high-resistivity electrolytes indicate lower deterioration rates than achieved with graphite anodes; in low-resistivity solutions, chemical attack of high-silicon iron by chlorine generated and trapped at the anode surface can be appreciable.

Coatings

How Radiation Affects Six Organic Coatings. Lt. L. A. Horrocks. *Materials in Design Eng. 47,* 120-3 (1958) Jan.

Phenolic coatings, silicone-alkyd enamels, alkyd enamels, epoxy coatings, fluorinated vinyl coatings and nitrocellulose lacquers were tested and rated for resistance to gamma radiation. Approximate limits of radiation resistance in roentgens are given for each coating.

How NGP Hot-Coats Pipe. P. Reed. *Oil Gas J. 56,* 117-8, 20 (1958) Jan. 13.

Technique of applying asphalt coating with imbedded glass mat on 87-mile Texas-Oklahoma transmission line. Outside wrapping of kraft paper holds coating in place.

On-the-Job Application of Thin Film Coating. J. C. Watts. *Pipe Line Ind. 8,* 49-52 (1958) Jan.

Pipeline engineers are carefully watching first major installation of a thin film coating. Portable coating yard is designed to handle application of exterior coat by spray gun. Atmospheric conditions have negligible effect as result of coating techniques developed.

Map Your Protective Coating Program. *Chem. Eng. 65,* 125-8 (1958) Feb. 10.

Dow Chemical Co.'s Texas Division has a systematic program which calls for paint schedules, systematic selection of economical protective coatings and more efficient and effective use of materials of construction. Maintenance painting costs are 40% less than they were eight years ago. The program is directed by a Paint Committee.

Corrosion

High-Temperature Hydrogen Sulfide Corrosion of Stainless Steels. E. B. Backensto, R. E. Drew, J. E. Prior and J. W. Sjoberg. *Corrosion 14,* 27t-31 (1958) Jan.

Results of laboratory investigations, chiefly on stainless steels, conducted for (1) possible application of new manganese-modified stainless steels; (2) effect of heat treatment on corrosion rate; (3) comparison of corrosion rates of wrought, weld and cast stainless steel; and (4) determination of stress corrosion cracking.

Corrosion, Cathodic Protection and Common Sense. B. Husock. *Pipe Line News 30,* 49-52 (1958) Jan.

Critical analysis of "common sense" approach to underground corrosion problems, with emphasis on using established techniques to save money, reduce waste and avoid creation of problems.

Protection of Plant and Equipment in the Petroleum and Chemical Industries. H. B. Footner. *Chem. & Process Eng. 39,* 15-8, 33 (1958) Jan.

Prevention of corrosion by the application of protective coatings; discussion of causes of corrosion and proper treatments.

Corrosion in Amine Gas Treating Solutions. F. S. Lang and J. F. Mason, Jr. *Corrosion 14,* 105t-8 (1958) Feb.

Tests conducted on stainless steels, Monel and nickel in amine solution saturated with carbon dioxide and hydrogen sulfide indicated that types 304 and 316 stainless steel gave consistently low corrosion rates under all conditions. Monel was satisfactory when carbon dioxide or hydrogen sulfide was present singularly in the amine.

Corrosion Products of Mild Steel in Hydrogen Sulfide Environments. F. H. Meyer, O. L. Riggs, R. L. McGlasson and J. D. Sudbury. *Corrosion 14,* 109t-15 (1958) Feb.

Mild steel coupons were exposed at room temperature to hydrogen sulfide passed through either water, brine or brine with CO_2. Product analysis was aided by an improved x-ray technique for identifying very thin corrosion product in place on steel. Initial corrosion product was kansite (Fe_9S_8).

Corrosion of Stainless Steels in Boiling Acids and Its Suppression by Ferric Salts. M. A. Streicher. *Corrosion 14,* 59t-70 (1958) Feb.

Detailed study of the influence of various alloying elements in stainless steels (straight chromium, AISI 400 series, 18 Cr-8 Ni, AISI 300 series, and some Cr-Mn-Ni steels) on the course of attack by eight acids (oxalic, formic, acetic, hydroxyacetic, phosphoric, sulfuric, sulfamic and sodium bisulfate). Factors in the environment (acid concentration, corrosion products and oxygen) which determine the course of corrosion also were investigated.

Stainless Steels for Corrosion Resistance. L. R. Honnaker. *Chem. Eng. Progress 54,* 79-82 (1958) Jan.

Minimization of failures from pitting, crevice corrosion, intergranular corrosion, stress-corrosion cracking and related phenomena where general corrosion is actually slight is important if optimum performance of stainless steel equipment is to be realized.

Fuel Ash Attack on Aluminum Coated Stainless Steel. J. E. Srawley. *Corrosion 14,* 36t-8 (1958) Jan.

Investigation of the resistance of hot-dip aluminum coated Type 310 stainless steel to attack by residual oil as constituents. Coated specimens did not exhibit better resistance than the uncoated steel; nor did prior heat treatment of coated specimens have an appreciable effect. Boiler tests and laboratory findings were in close agreement.

Structural Features of Corrosion of Aluminum Alloys in Water at 300° C. K. M. Carlsen. *Corrosion 14,* 53t-6 (1958) Jan.

Aluminum alloy specimens were immersed in 300°C distilled water and studied for structural features of corrosion. Sample alloys included Al-Ni, Al-Fe, Al-Ni-Fe, Al-Cu and Al-Ni-Si. After exposure, samples were examined by means of a metallographic microscope.

Compilation and Correlation of High Temperature Catalytic Reformer Corrosion Data. G. Sorell. *Corrosion 14,* 15t-26 (1958) Jan.

Compilation and summary of the available quantitative high temperature corrosion data pertinent to catalytic reforming processes and correlation of the findings in a form applicable to process equipment design. Corrosion rate measurements are presented in tabular and graphical form and are correlated in three summary graphs.

Inhibitors

A Copper Ion Displacement Test for Screening Corrosion Inhibitors. W. B. Hughes. *J. Petrol. Tech. 10,* 54-6 (1958) Jan.

Method for selecting the most suitable corrosion inhibitor for a particular system involves the evaluation of surface passivity by means of copper ion displacement after the metal surface has been subjected to the corrosive atmosphere. Application of method to the selection of suitable inhibitors for use in producing wells is described.

Plastics

Joining and Fastening Plastics. M. W. Riley. *Materials in Design Eng. 47,* 129-44 (1958) Jan.

Survey discloses most suitable plastics, the bond characteristics, design considerations and application techniques for joints made by solvent cementing, adhesive bonding, thermal welding and mechanical fastening.

Fourteen Organizations Form Team to Set Reliability Standards for Fiber-Reinforced Plastics. F. R. Park. *Prod. Eng. 29,* 69-71 (1958) Feb. 3.

Owens-Corning Fiberglas' five year program to uncover basic design data will include five experiments to cover six variables. The study includes Graeco-Latin Square analysis to make every test count; statistical data analysis for known confidence limits; data organized for computer correlation.

Refractories

Silicon Nitride Refractory Offers . . . T. F. Frangos. *Materials in Design Eng. 47,* 115-7 (1958) Jan.

High-temperature stability, resistance to molten nonferrous metals and good thermal shock resistance are some of the properties of this relatively new refractory. Article includes valuable design information.

The Slagging of Refractories by Brown Coal Ash. K. Grant. *Australian J. Appl. Sci. 8,* 323-34 (1957) Dec.

Several British and Australian refractories were heated with brown coal ash to temperatures from 1200°-1400°C. Examinations and measurements showed that refractories with a high alumina content appeared to resist the attack of brown coal slags better than those with a high silica content.

How Molten Aluminum Affects Plastic Refractories. H. A. McDonald, J. E. Dore and W. S. Peterson. *J. Metals 10,* 35-7 (1958) Jan.

Uncalcinated clay content of a plastic refractory determines its resistance to molten aluminum and the phase changes it goes through on firing.

Silicones

Silicones and Their Applications. J. Ames. *J. Sci. Instruments 35,* 1-8 (1958) Jan.

Because they can function in the form of fluids, rubbers or resinous films at temperatures beyond the range of their organic counterparts, silicones are becoming more important to industry. Current limitations are mechanical weakness and relative high cost.

12. ANALYTICAL METHODS AND TESTS

Carbon-Hydrogen

Microdetermination of Carbon and Hydrogen by Rapid Combustion Procedure. G. I. Robertson, L. M. Jett and L. Dorfman. *Anal. Chem. 30,* 132-5 (1958) Jan.

A total elapsed time of only 20 minutes is required when using this new, rapid microdetermination of carbon and hydrogen. Pregl-type absorption tubes are modified so that weight gain due to temperature changes is balanced by loss due to oxygen diffusion when weighings are made immediately. Sample is burned in quartz capsule.

Chromatography

Effect of Type and Amount of Solvent on Analysis of Saturated Hydrocarbons. F. T. Eggertsen and H. S. Knight. *Anal. Chem. 30,* 15-9 (1958) Jan.

In gas chromatography of saturated hydrocarbons, adsorption on surface of support may be controlled to provide a wide naphthene-paraffin selectivity range by adjusting amount of solvent. Paraffins are retarded with small amounts of supported solvent. Naphthenes are retarded on liquid partition-type packing. Type of supported solvent also has effect on solutions obtained.

Determination of Five- to Seven-Carbon Saturates by Gas Chromatography. F. T. Eggertsen and S. Groennings. *Anal. Chem. 30,* 20-5 (1958) Jan.

A blend of 25 C_5 to C_7 saturates can be analyzed for all components (except 3-ethylpentane) by gas chromotography using three different types of columns. This analysis can be conducted in 12 to 16 hours of elapsed time. Results are in close agreement with API cooperative testing of same sample by other means.

Two-Stage Gas-Liquid Chromatography. M. C. Simmons and L. R. Snyder. *Anal. Chem. 30,* 32-5 (1958) Jan.

Two or more gas-liquid chromatographic columns can be connected by an instrument arrangement, in such a manner that preliminary cuts prepared by first column can be charged directly to one or more secondary columns. This shortens the total time of analysis and permits separations and analyses not possible with a one-stage unit.

The Determination of Heats of Adsorption by Gas-Solid Chromatography. S. A. Greene and H. Pust. *J. Phys. Chem. 62,* 55-8 (1958) Jan.

Utilization of an equation for gas-solid chromatography permits heats of adsorption of eluted gases on column adsorbents to be determined from the parameters of gas-solid chromatography. Heats of adsorption of some low boiling gases on charcoal and light hydrocarbons on alumina and silica gel are determined and are found to agree well with those obtained calorimetrically and isosterically.

CO_2 in Coal

Four Methods of Determination of Carbon Dioxide in Solid Fuels. P. A. Krumin and K. Svanks. *ASTM Bull. 227,* 51-7 (1958) Jan.

Comparative study of apparatus and procedures for gravimetric, titrometric, gas-volumetric and pressometric methods.

Gas Detector

Combustible Gas Sensing Elements. C. M. Page. U.S. 2,816,863 (1957) Dec. 17.

Combustible gas sensing element adapted to determine the presence of mixtures of combustible gas and air or combustible gas and oxygen, below the lower explosive limits, comprising a carrier made of asbestos, ceramic material or nickel-chromium alloys. This carrier is impregnated with thorium oxide and a sensing agent made of either platinum or palladium.

Gas Oil Evaluation

A Procedure for the Examination of Oils on Their Suitability for Catalytic Oil Gasification on a Small Scale. von S. Schubert and K. Günther. *Gas- und Wasserfach 49,* 1224-7 (1957) Dec. (German text.)

Two methods are generally used for an approxi-

mate estimation of the suitability of an oil for catalytic gasification. One is the determination of the C/H ratio and the other is the coke residue method developed by Conradson. The only method for reliable evaluation is the experimental method on a laboratory scale. The principle and development of the laboratory equipment are explained and the procedure and result of this method are outlined and illustrated.

Halogen Method

Combuston-Amperometric Titration of Traces of Halogen in Petroleum Products. L. J. Cali, W. Loveland and D. G. Partikian. *Anal. Chem. 30,* 74-7 (1958) Jan.

A sensitive analytical method for determining ppm of halogen in petrochemical hydrocarbons utilizes a Beckman atomizer burner for sample combustion. Sample is aspirated into oxyhydrogen flame and products are collected in a sodium carbonate absorber. Sodium chloride formed is titrated amperometrically with silver nitrate.

Infrared Analysis

Improved Optical Null Infrared Spectrophotometer. L. W. Herscher, H. D. Ruhl and N. Wright. *J. Optical Soc. Am. 48,* 36-42 (1958) Jan.

New design incorporates several features directed toward improved quantitative accuracy of chemical analysis, particularly differential analysis. Differential performance is demonstrated by use of a difficult example of an impurity of propylbenzene in ethylbenzene. Improvements include a new type of radiation attenuator, improved scan-speed control, a means for automatic gain control during differential, an arrangement for by-passing a small amount of radiation around the sample cell to provide a dynamic balance at zero transmission, expansion of pen travel and use of a nonlinear wavelength scale.

Identification of Reclaimed Oils by Statistical Discrimination of Infrared Absorption Data. A. Ungar and A. M. Trorzzolo. *Anal. Chem. 30,* 187-91 (1958) Feb.

A statistical function, Q, of infrared absorbances, at 14 wave lengths, of virgin and reclaimed automotive engine lubricating oils, in an analytical method for discriminating between the oils. Method relies on differences in complexity of composition of most virgin and reclaimed oils for its success, since for technical and economic reasons, most reclaimed oils are a complex mixture of crude sources, whereas individual virgin oils usually are blended from only a few crudes.

Nitrogen Method

Determination of Pyrrolic Nitrogen in Petroleum Distillates. M. A. Muhs and F. T. Weiss. *Anal. Chem. 30,* 259-66 (1958) Feb.

An improved colorimetric determination of pyrrolic compounds yields optimum reaction conditions with *p*-dimethylaminobenzaldehyde. A standard set of absorptivities have been established for this method which has broad general applicability. High olefin content causes interference (high results) and pyrroles first must be removed by chromatography.

Potentiometric Titrimetry

Potentiometric Electrode Systems in Nonaqueous Titrimetry. J. T. Stock and W. C. Purdy. *Chem. Rev. 57,* 1159-77 (1957) Dec.

Potentiometric aspects of monaqueous titrimetry are considered extensively but with the exclusion of the Karl Fischer method for water determination. Among the electrodes considered are the chloranil, the quinhydrone, the hydrogen, the glass, the platinum, the silver and miscellaneous indicator electrodes.

TEL Determination

Contribution to the Flame-Photometric Determination of Lead-Tetra-Ethyl in Carbureted Fuels. W. von Linné and H. D. Wülfken. *Erdöl u. Kohle 10,* 757-8 (1957) Nov. (German Text.)

Determination of tetraethyl lead by the flame-photometric method finds extensive use primarily because of the small time consumption (less than five min).

13. BASIC SCIENCE

Absorption

Absorption of Carbon Dioxide in Water under Pressure Using a Gas-Bubble Column. G. Houghton, A. M. McLean and P. D. Ritchie. *Chem. Eng. Sci. 7,* 26-39 (1957).

Study of a bubble-type water scrubber with special reference to the absorption of large quantities of carbon dioxide from gas mixtures consisting main-

ly of this substance. The effect of various operating variables is determined, and the superiority of this type of scrubber over the packed-tower type is demonstrated.

Acetone-C_4 Systems

Relative Volatility and Enthalpy Data for the Systems C_4 Hydrocarbons-Acetone-Water Developed from Vapor-Liquid Equilibria. J. E. Ewanchyna and C. Ambridge. *Can. J. Chem. Eng. 36,* 19-36 (1958) Feb.

Pseudo-binary systems of each of the hydrocarbons, *n*-butane, isobutane, butene-1 and *cis*-butene-2, and the solvent, acetone-water, were investigated at temperatures of 100°, 150°, and 200°F, at water concentrations of 5, 11 and 17 wt %, (C_4 hydrocarbon-free) and at hydrocarbon concentrations up to 28 mole %. Studies were confined to a range of approximately 0 to 28 mole % to avoid phase separation.

Adsorption

The Heats of Adsorption of the Inert Gases on Charcoal at Low Pressure. K. F. Chackett and D. G. Tuck. *Trans. Faraday Soc. 53,* 1652-8 (1957) Dec.

Heats of adsorption of neon, argon, krypton and xenon on charcoal are discussed in relation to the surface coverage of the adsorbent, to some of the physical properties of the inert gases and to the published values for the heats of adsorption of helium and radon.

Fractionation of Certain Aromatic Hydrocarbons with Molecular Sieve Adsorbents. B. J. Mair and M. Shammaiengar. *Anal. Chem. 30,* 276-9 (1958) Feb.

Certain aromatic hydrocarbon molecules can be separated according to the shape and size of the molecule by using molecular sieve adsorbents of different pore sizes. They can also provide information on structure of hydrocarbon molecules. Method is tested with mixtures of pure aromatic hydrocarbons and petroleum fractions in the C_{18}-C_{25} range.

CS_2-Alumina

The Reaction of Carbon Disulphide with Alumina. A. G. Pinkus and J. S. Kim. *Can. J. Chem. 36,* 296-302 (1958) Feb.

Study of the gain in weight of the alumina with time of contact with CS_2 to determine point at which reaction levels off. A minimum value of heat evolved for the alumina–carbon disulfide system was determined as 8.6 cal/g of alumina reacting with an excess of CS_2.

Decalin Thermodynamics

Thermodynamic Functions for Gaseous *cis*—and *trans*—Decalins from 298 to 1000° K. T. Miyazawa and K. S. Pitzer. *J. Amer. Chem. Soc. 80,* 60-4 (1958) Jan. 5.

Values of the heat content function, free energy function, heat capacity and entropy of *cis*—and *trans*–decalins have been calculated by the use of molecular and thermal data. Functions are tabulated from 298°-1000°K. Heat, free energy and equilibrium constants of the reactions $C_{10}H_8 + 5H_2 =$ *cis* $- C_{10}H_{18}$, $C_{10}H_8 + 5H_2 =$ *trans* $- C_{10}H_{18}$, also have been calculated and tabulated.

Diffusion Coefficients

Diffusion Coefficients in Hydrocarbon Systems: Methane in the Liquid Phase of the Methane—*n*-Heptane System. H. H. Reamer and B. H. Sage. *J. A. I. Ch. E. 3,* 449-53 (1957) Dec.

Measurements of the Fick diffusion coefficients for methane were obtained in the liquid phase of the methane—*n*-heptane system at temperatures in the range of 40°-340°F at pressures up to 3500 psi. but the pressure range was limited at the higher temperatures by approach to the critical state of this binary system. It was confirmed that the Fick diffusion coefficients for methane decrease with an increase in the concentration of this component and increase rapidly with an increase in temperature for a constant composition. These and other data obtained for other binary paraffin hydro-carbon systems indicate that the Fick diffusion coefficients for methane decrease with an increase in the molecular weight of the less volatile component.

Distillation

For 99.XXX% Pure Products Find Distillation Stages Graphically. P. J. Horvath and R. F. Schubert. *Chem. Eng. 65,* 129-32 (1958) Feb. 10.

Article describes a special variation of the McCabe-Thiele graphical method for calculating theoretical plate requirements in binary distillation systems. Primary emphasis is on the ends of a distilling column where either very high or very low product concentrations are involved.

Flash Equilibria

New Method for V/L Flash Calculatons. R. Salmon. *Petrol. Refiner 36,* 133-6 (1957) Dec.

Two methods have been designed to reduce trial and error in certain types of vapor-liquid equilibrium calculations. The first is applicable when a make-up gas stream enters the system, in addition to the main feed. The second method is useful where the vapor phase from the flash is recycled through a scrubbing system back to the flash drum while one component is being continuously removed.

Fluid Flow

Recent Developments in Fluid Flow. R. C. Binder. *Petrol. Refiner 36,* 125-9 (1957) Dec.

Increasing concern with applications involving laminar and turbulent flow, and serious attempts to make engineering studies more rational (rather than empirical) has focused attention on the mechanism or nature of laminar flow, turbulent flow and transitional flow. The computation of the turbulent boundary layer for engineering applications is still in a somewhat empirical state. Real progress has been made in establishing a theoretical framework for calculating the stability of laminar flow. It does not, at the present time, appear possible to describe by a single mechanism all the phenomena associated with transitions.

Fluidization

Mechanism of Formation of Gas Bubble-Beds. G. Houghton, A. M. McLean and P. D. Ritchie. *Chem. Eng. Sci. 7,* 40-50 (1957).

Data on the size, number and size-distribution of bubbles in fluidized bubble-beds and foam beds are presented. These beds differ in that bubble diameter and density tend to become constant for the former when superficial gas velocity is increased, whereas bubble density tends to decrease and diameter increase for the latter. Also, foam beds are sensitive to size, number and distribution of the pores in the gas distributor.

Gas Dielectrics

Theory of the Dielectric Constant of Imperfect Gases and Dilute Solutions. T. L. Hill. *J. Chem. Phys. 28,* 61-6 (1958) Jan.

Derivation of general statistical mechanical equations for the polarization, Clausius-Mossotti function, electric constant and electrostriction of an imperfect gas. Results are given in the form of series expansions which are closely related to the conventional virial expansion of a gas.

Heat Transfer

On Shape Factors for Irregular Particles. R. Aris. Part 1. **The Steady State Problem. Diffusion and Reaction.** *Chem. Eng. Sci. 6,* 262-8 (1957). Part 2. **The Transient Problem. Heat Transfer to a Packed Bed.** *Ibid., 7,* 8-14.

Modification of method for solving problem of heat or matter transfer for a bed of spherical particles for application to bed of irregularly shaped particles. The ratio of the volume of the particle to its external surface area v_p/s_x is used. In the transient heat or matter transfer problem, using this formula as the characteristic dimension does not reconcile the results for different particle shapes. However, a new shape factor can be introduced. Relationship of two problems and Amundson's solution for spherical particles is discussed.

Mass-Transfer Cooling of a Laminar Boundary Layer by Injection of a Light-Weight Foreign Gas. E. R. G. Eckert, P. J. Schneider, A. A. Hayday and R. M. Larson. *Jet Propulsion 28,* 34-9 (1958) Jan.

Analytical predictions for the development of the velocity, temperature and concentration fields in a laminar air boundry layer on a flat plate in high-speed dissipative flow, the plate being considered porous and cooled by injection of hydrogen from its surface.

Heat Transfer from Column Wall to Bed in Spouted, Fluidized and Packed Systems. J. Klassen and P. E. Gishler. *Can. J. Chem. Eng. 36,* 12-8 (1958) Feb.

Comparison of data shows that in the case of spouted beds, the heat transfer coefficient increases sharply at the onset of spouting and passes through a maximum as the gas velocity is increased. Maximum heat transfer coefficient is from 25-75% lower for a spouted bed than for a fluidized bed under similar flow conditions. Rice, wheat and Ottawa sand were used as bed materials.

Unsteady State Heat Transfer in Stationary Packed Beds. P. M. Reilly. *J.A.I.Ch.E. 3,* 513-6 (1957) Dec.

A new method of solving the differential equations which describe unsteady state heat transfer in stationary beds of small granular solid particles through which a fluid is flowing. Arbitrary initial solid temperature distribution and arbitrary variation of inlet gas temperature are allowed. The solution derived appears easier to apply in practice than those previously published and affords an example of the versatility of Fourier integrals and series. The article also demonstrates an application of the solution to the regeneration of Dow type-B butylene dehydrogenation catalyst.

Heating of Surfaces by Buried Pipes: Calculation of the Steady and Periodic States. R. W. Muncey and G. A. Watterson. *Australian J. Appl. Sci. 8,* 271-8 (1957) Dec.

Method for the calculation of the temperature and heat flow at the surface is derived by relating these to the temperature and heat flow at the buried wires or pipes. These relations vary with the period of the temperature cycle.

Heat of Vaporization

Heats of Vaporization of Hydrogen-Bonded Substances. A. Bondi and D. J. Simkin. *J.A.I.Ch.E. 3,* 473-9 (1957) Dec.

A new method is proposed for the calculation of the heat of vaporization of hydroxylated compounds to an accuracy of about ± 0.5 kcal/mole from no more data than the molecular structure and a boiling point. It is based on the assumption that the heat of vaporization consists of the dispersion energy and the hydrogen-bond increment (close but not equal to the hydrogen-bond strength). The first term is calculated from a knowledge of the heat of vaporiaztion of the equistructural hydrocarbon and the hydrogen-bond term from a set of rules given in the report.

How to Estimate Engineering Properties. W. R. Gambill. Part 1. **Determine Heat of Vaporization.** *Chem. Eng. 64,* 261-6 (1957) Dec.; Part 2. **Temperature vs. Heat of Vaporization.** *Ibid. 65,* 159-62 (1958) Jan. 13.

Various applications and modifications of the Clapeyron equation are derived and graphed to determine latent heat of vaporization.

Hydrocarbon Properties

The Correlation and Prediction of the Optical and Thermodynamic Properties of Saturated Liquid Hydrocarbons by the Group Contribution Method. C. W. Nutt. *Trans. Faraday Soc. 53,* 1538-44 (1957) Dec.

Development of a group contribution method for the estimation of the standard heat of formation and the refractive index and magneto-optical rotary constant for the sodium *D*-line for paraffinic and naphthenic hydrocarbons in the liquid state.

Hydrogen

Pressure-Induced Infrared Absorption of Hydrogen and Hydrogen-Foreign Gas Mixtures in the Range 1500-1500 Atmospheres. W. F. J. Hare and H. L. Welsh. *Can. J. Phys. 36,* 88-103 (1958) Jan.

Q component, an essential of the fundamental absorption band, increases linearly with the density because of ternary collisions. A more rapid increase observed at very high densities is not yet explained. From the intensity distribution in all components and from temperature variation, it was concluded that the relative kinetic energies of the colliding pair and of the surrounding molecules take part in the absorption process.

Ice Properties

Dielectric Relaxation and the Electrical Conductivity of Ice Crystals. J. Granicher, C. Jaccard, P. Scherrer and A. Steinemann. *Discussions of the Faraday Society 23,* **Molecular Mechanism of Rate Processes in Solids.** (1957).

Application of dynamic behavior of dielectrics to ice, assuming that polarization changes occur only at lattice imperfections of two types: orientational defects and ionized states. Possible proton jumps are computed statistically in both cases. Theory gives correct dispersion behavior; theory then is extended to mixed-crystals with HF.

Ion Exchange Resins

Industrial Applications of Ion Exchange Resins. R. M. Wheaton and R. E. Anderson. *J. Chem. Education 35,* 59-65 (1958) Feb.

Assimilation of facets of information, types of applications with representative example, ion exchange equipment and the economy and anticipated growth of industrial applications.

Ionization Energies

Reactions Involving Electronically-Excited Oxygen. E. K. Gill and K. J. Laidler. *Canad. J. Chem. 36,* 79-88 (1958) Jan.

Reactions involving various electronically excited states of oxygen atoms and molecules are discussed with reference to the experimental evidence and to the potential-energy surfaces on which they occur. Consideration is given to the mercury-photosensitized formation of ozone from oxygen and to the mechanism of formation of excited oxygen in the carbon monoxide and other flames.

Excited States of the Molecular Ions of Hydrogen Fluoride, Hydrogen Iodide, Water, Hydrogen Sulphide, and Ammonia. D. C. Frost and C. A. McDowell. *Canad. J. Chem. 36,* 39-47 (1958) Jan.

Molecular ionization of hydrogen fluoride, hydrogen iodide, water, hydrogen sulfide and ammonia, by essentially monenergetic electrons, has been studied in a mass spectrometer. Various excited states of the molecular ions have been observed and corresponding energy levels measured. Results interpreted in terms of electronic structures of the molecules as given by molecular orbital theory.

Mass Transfer

Sublimation from Disks to Air Streams Flowing Normal to Their Surfaces. H. H. Sogin. *Trans. ASME 80,* 61-9 (1958) Jan.

Mass transfer by sublimation from 4-in. diam napthalene disks to the stagnation regions of impinging jets of air was calibrated with heat transfer by convection in an identical configuration. Results were brought into a single correlation, within the limits of the experimental reproducibility, using Colburn's formulation of the heat-mass analogy.

Mercury Pressure

The Solubility of Mercury in Gases at Moderate Pressures. W. B. Jepson, M. J. Richardson and J. S. Rowlinson. *Trans. Faraday Soc. 53,* 1586-91 (1957) Dec.

The rate of diffusion of liquid mercury, when it is in equilibrium with propane and *n*-butane, has been measured at the highest temperature. High concentration of mercury adversely affects the accuracy of gas isotherms measured in the presence of mercury.

Methylene Addition

Reactions of Methylene. I. Ethylene, Cyclopropane and n-Butane. H. M. Frey and G. B. Kistiakowsky. *J. Am. Chem. Soc. 79,* 6373-9 (1957) Dec. 20.

Methylene, produced photochemically from ketene in the gas phase, substitutes into the primary and secondary C-H bonds of propane and butane with a probability ratio of 1:1.7 at room temperature, which can be increased by adding argon or carbon dioxide to the mixture. With ethylene, methylene forms propylene and cyclopropane (probability ratio of 1:6), the cyclopropane isomerizing into propylene. With cyclopropane, methylene forms exclusively methylcyclopropane, which isomerizes into butenes. In the reactions of methylene with the alkanes, ethane is a byproduct; in the reaction with ethylene the main byproducts are ethane and *n*-butane.

NO-Charcoal Reaction

The Oxidation of Charcoal by Nitric Oxide and the Effect of Some Additives. H. Watts. *Trans. of the Faraday Society 54,* 93-105 (1958) Jan.

Kinetics of reaction between charcoal and nitric oxide were studied quantitatively in the temperature range 578°-723°K. Reaction obeys a first-order rate law over the NO pressure range 1.4-22 mm Hg. Effect of some catalysts has been studied, and a mechanism has been proposed to account for the main features of the observed kinetics.

Palladium-Hydrogen

Neutron-Diffraction Observations on the Palladium-Hydrogen and Palladium-Deuterium Systems. J. E. Worsham, M. K. Wilkinson and C. G. Shull. *Phys. and Chem. of Solids 3,* 303-10 (1957) Nos. 3/4.

Neutron-diffraction investigations on powdered samples have indicated that both hydrogen and deuterium atoms in β-phase Pd-H and Pd-D are located in the octahedral positions of the palladium lattice. Results obtained for samples with low gas concentrations are inconclusive in determining the atomic positions in the α-phase, since at room temperature only a small amount of gas enters this phase. Although the vibrational amplitudes of hydrogen and deuterium are similar to those observed in other compounds, the total neutron-scattering cross-section for hydrogen in this system is abnormally

low, indicating that the protons are more nearly free than in the other hydrogen compounds.

Photochemical Kinetics

The Photochemical Oxidation of Aldehydes in the Gaseous Phase. C. A. McDowell and L. K. Sharples. Part 1. **The Kinetics of the Photochemical Oxidation of Acetaldehyde.** *Canad. J. Chem. 36,* 251-7 (1958) Jan.; Part 2. **The Kinetics of the Photochemical Oxidation of Propionaldehyde.** *Ibid.,* 258-67 (1958) Jan.

Study of the photochemical oxidation of acetaldehyde and of propionaldehyde in the gaseous phase at 20° and 23° C, respectively, and at a wavelength of 3130 A. The kinetic law for the reaction of acetaldehyde at oxygen pressures varying between 0.5 and 150 mm is discussed in Part 1, and of propionaldehyde at oxygen pressures varying between 0.3-100 mm Hg in Part 2.

Radiation Chemistry

Fragmentation of Methane by Electron Impact, and the Latent Heat of Sublimation of Carbon. J. D. Morrison and H. E. Stanton. *J. Chem. Phys. 28,* 9-11 (1958) Jan.

Ions produced in the fragmentation of methane by electron impact have been found to be formed with initial kinetic energy. Considering this energy, the electron impact data on methane are shown to be compatible with the spectroscopically acceptable value of 171 kcal/mole for the latent heat of sublimation of carbon in agreement with the value obtained by direct measurement.

Radiolysis of Ethane: Isotopic and Scavenger Studies. L. M. Dorfman. *J. Phys. Chem. 62,* 29-33 (1958) Jan.

Electron radiolysis of ethane has been studied at room temperature to determine the contribution of molecular detachment processes to the formation of the radiolysis products hydrogen and oxygen. Two types of reaction are suggested as possible molecular detachment processes.

Radiolysis of Pentane Adsorbed on Mineral Solids. J. M. Caffrey, Jr., and A. O. Allen. *J. Phys. Chem. 62,* 33-7 (1958) Jan.

The total amount of decomposition which occurs when *n*-petane yields are distilled onto various solids of large surface area and then irradiated with γ-rays appears to be greatly increased by the presence of silica gel, so that a specific transfer of energy from the silica to the adsorbed pentane must be postulated. The results appear to reopen the question of the role of radioactivity in the genesis of petroleum.

Radiation Chemistry of Organic Compounds. H. A. Dewhurst. Part 1. *n*-Alkanes. *J. Phys. Chem. 61,* 1466-71 (1957) Nov.; Part 2. *n*-Hexane *Ibid. 62,* 15-20 (1958) Jan.

A series of *n*-alkane liquids, pentane to hexadecane, have been irradiated with 800 kvp electrons. The hydrogen yield, $G(H_2) = 4.9$, was found to be independent of the carbon atom chain whereas the methane yield decreased with increase in the length of the chain. The formation of gas and liquid products in the 800 kvp electron radiolysis of *n*-hexane liquid was studied as a function of the energy absorbed, temperature and the presence of solutes. The hydrogen yield decreased with temperature to a limiting value in the solid state. The same limiting yield was attained in the presence of solutes.

Identification of Products in the Radiolysis of Liquid Benzene. S. Gordon, A. R. Van Dyken and T. F. Doumani. *J. Phys. Chem. 62* 20-4 (1958) Jan.

Liquid benzene was irradiated by Co^{60} gammas in a cell which continuously extracted the non-volatile fractions during the irradiation as well as in a static cell irradiated by the radiations from spent fuel-rod assemblies. The non-condensable products were found to contain a C_{12} fraction, containing biphenyl, phenlycyclohexadiene, phenylcyclohexene and bicyclic compounds in which neither ring is aromatic, and a C_{18} fraction containing hydrogenerated terphenyls and a higher molecular weight fraction.

"Solion" Transducer

Energy Transducer Appears Promising. *Power 102,* 89 (1958) Feb.

Newest member of the vacuum tube and transistor family, the *solion,* uses mechanical pumping action of a diaphragm to move reduced iodine ions in solution through an orifice (cathode) to side plate anodes. Current flow can be amplified from a quiescent 0.015 to a maximum 1.0 milliwatt at 1 v.

Solubilities

The Solubilities of Gases in Polyvinyl Acetate. P. Meares. *Trans. of the Faraday Society 54,* 40-6 (1958) Jan.

Solubility coefficients *s* of helium, neon and hydrogen in polyvinyl acetate were determined between 8° and 40° by establishing equilibrium between polymer and gas phase and then desorbing the gas into a known large volume. Pressures up to 20 cm Hg were used and Henry's law obeyed. It is concluded that below the glass temperature Tg there are regions of minimum density in the polymer which constitute high energy sorption sites into which gas molecules penetrate preferentially. These low density regions are too small for gas molecules in them to be thermodynamically similar to molecules free in gas phase.

Ternary Systems

The Analysis of Three-Component Liquid Systems. J. R. Bourne. *Chem. & Process Eng. 39,* 19-23 (1958) Jan.

Requirements for analysis of ternary systems, essential to design work, are discussed, with a review of the known chemical and physical methods.

Thiol Properties

2-Methyl-1-Propanethiol: Chemical Thermodynamic Properties and Rotational Isomerism. D. W. Scott, J. P. McCullough, J. F. Messerly, R. E. Pennington, I. A. Hossenlopp, H. L. Finke and G. Waddington. *J. Amer. Chem. Soc. 80,* 55-9 (1958) Jan. 5.

The chemical thermodynamic properties of 2-methyl-1-propanethiol in the vapor state (0°-1000°K) were calculated by methods of statistical mechanics utilizing observed values of the standard entropy, heat capacity and heat of formation. Thermodynamic results are consistent with spectroscopic evidence for a small energy difference between rotational isomers. Experimental studies provided information on heat capacity for solid, liquid and vapor; triple point temperature; heat of fusion; thermodynamic functions; heat of vaporization; second virial coefficient; vapor pressure and standard heat of formation.

Transport Properties

How Transport Data Accuracy Affects Design. L. Friend and S. B. Adler. *Petrol. Refiner 37,* 191-3 (1958) Jan.

Thermal conductivity and viscosities are transport properties most frequently used in process design. The accuracy of these properties required for pressure drop and heat transfer calculations are discussed.

Viscosity

This Equation Gives Viscosity. L. F. Albright and K. K. Innes. *Petrol. Refiner 36,* 155-8 (1957) Dec.

A modified rate equation has been found to correlate the available viscosity data of normal paraffins, benzene, isobutane, 1—butene and methylcyclopentane over wide temperature ranges. This equation is presumed to be applicable for other hydrocarbons in the aromatic isoparaffin, olefin and cycloparaffin families.

The Viscosity of Five Gases: A Re-Evaluation. J. Kestin and H. E. Wang. *Trans. ASME 80,* 11-7 (1958) Jan.

Based on an improved theory of the oscillating disk, the results of this reevaluation for air, nitrogen, argon, helium and hydrogen are given in graphical and tabular form as well as in the form of empirical equations. Range covered is 1-70 atm at 25°C. Very good agreement with previously published data for nitrogen, air and hydrogen has been reported.

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